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MODULE 3
FRACTIONS AND DECIMALS

Distance Learning

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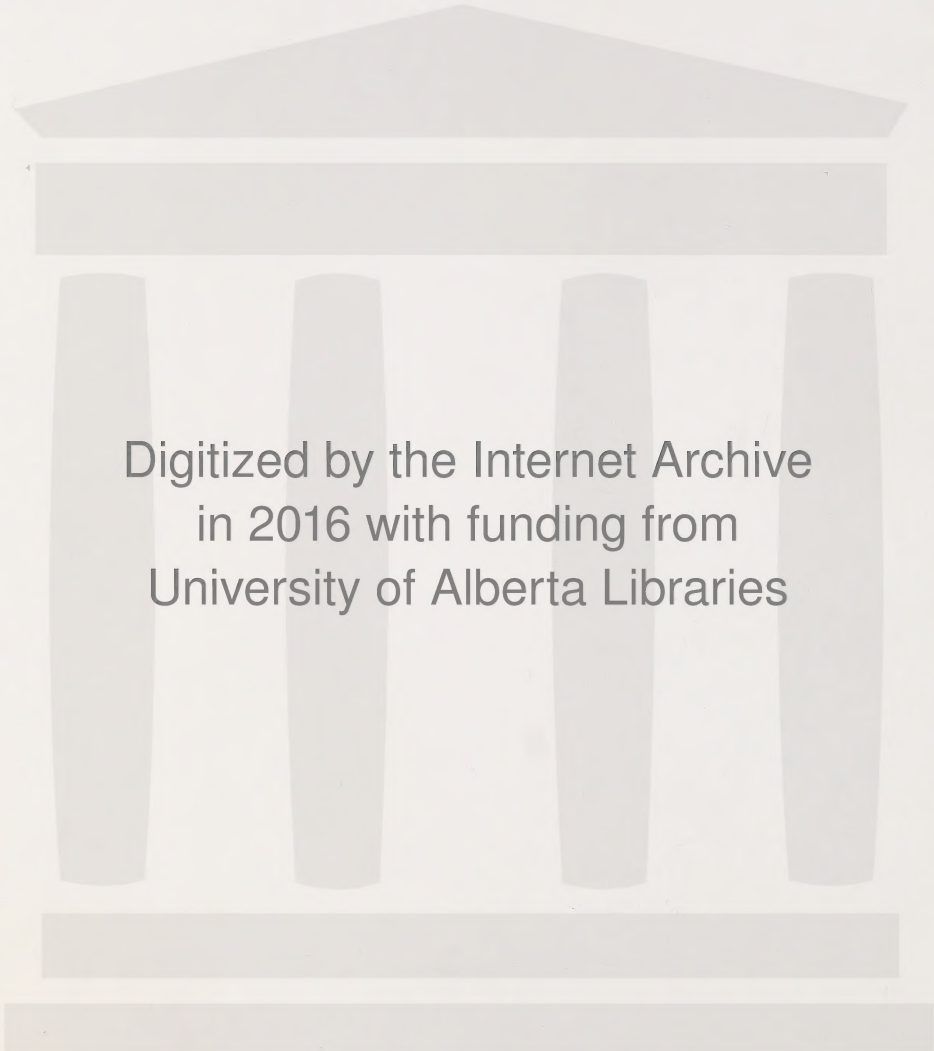
STUDENT SUPPORT GUIDE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Mathematics 8

Module 3: Fractions and Decimals

STUDENT SUPPORT GUIDE

Note

This Mathematics Learning Facilitator's Manual contains answers to teacher-assessed assignments and the final test; therefore, it should be kept secure by the teacher. Student's should not have access to these assignments or the final test until they are assigned in a supervised situation. The answers should be stored securely by the teacher at all times.

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Student Support Guide
Module 3
Fractions and Decimals
Alberta Distance Learning Centre
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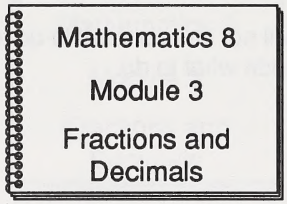
MODULE INTRODUCTION

What Lies Ahead

In this Module Introduction the student will preview the module and learn how the module will be evaluated.

Gathering Materials

For this section the student will need these items.



Guiding the Student

- Emphasize to the students that the goal of this section is to preview the module.
- Discuss the learning process, time management, and evaluation with the students. See the suggestions on the next page of this booklet.

The Learning Process

Each section of Module 3 deals with a different skill involving fractions and decimals. Sections have several activities.

- Introductory Activities
- Practice Activities
- Extra Practice
- Concluding Activities

Remind the students that they will not be expected to do all the activities. You will help them decide what to do.

Time Management

Decide how long the students will need to complete the module. An average student should spend about 7 weeks of a 40-week year to complete the module. It is recommended that students spend no more than 1 hour at a time doing mathematics.

Evaluation

Explain that the grade on Module 3 is based on work in the assignment booklet. The module booklet will help prepare students for the assignment booklet.

KEEPING SKILLFUL

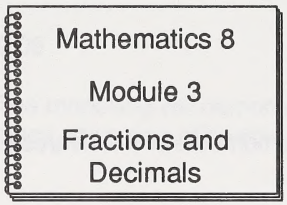
What Lies Ahead

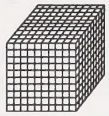
In this section the student will review these skills.

- recognizing place value of decimal numbers
- rounding decimal numbers
- comparing and ordering decimal numbers
- performing operations on decimal numbers
- applying the rules for order of operations

Gathering Materials

For this section the student will need these items.





base 10 blocks

Guiding the Student

- Emphasize to the students that the goal of this section is to review some of the skills developed in previous grades.
- Help the students check the answers to the review and correct any errors. If a student is still experiencing difficulty, you may with to assign sections in Mathematics 7, Module 3 and the accompanying Learning Aids Booklet.

Review

1. Circle the diagram to the right that represents 0.102 modelled with base 10 blocks.

represents 1

represents 0.1

represents 0.01

represents 0.001

2. Round the following decimal numbers to the nearest hundredth.

   a. 0.325

   b. 0.674

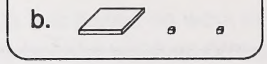
   c. 0.439

3. Arrange these decimal numbers in **ascending order** from least to greatest.

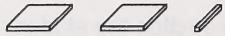
   0.25, 0.175, 0.251, 0.24, 0.3, 0.18

Suggested Answers

1. a.

   b. 

   c.

   d. 

2. a. 0.33

   b. 0.67

   c. 0.44

3. 0.175, 0.18, 0.24, 0.25, 0.251, 0.3

4. Model each of the following using base 10 blocks.

   a. 0.36 + 0.75

   b. 0.82 – 0.74

   c. 0.36 × 2

   d. 1.36 ÷ 4

4. a. 1.11

   The modelling will demonstrate an understanding of place value and of carrying (regrouping).

   b. 0.08

   The modelling will demonstrate an understanding of place value and of borrowing (regrouping).

   c. 0.72

   The modelling will demonstrate an understanding that 0.36 × 2 means 2 groups of 0.36.

   d. 0.34

   The modelling will demonstrate an understanding that 1.36 ÷ 4 means, "In 1.36 there are 4 groups of how many?"

5. Estimate each of the following. Then calculate the exact answers. Do not use calculators.

   a. $8.3664 + 0.32 + 0.008$

   b. $6 - 3.029$

   c. 7.39×1.8

   d. $33.4 \div 25$

   e. $2.94 \div 0.15$

6. Explain how you would use a calculator to find the remainder for $1394 \div 25$.

5. The estimates will vary, depending on the method used. The exact answers are provided.

   a. 8.6944

   b. 2.971

   c. 13.302

   d. 1.336

   e. 19.6

6. Use your calculator to find the decimal part of the answer. Then multiply the decimal part by the divisor.

Key Press	Display
1 3 9 4 ÷ 2 5 =	55.76
− 5 5 =	0.76
x 2 5 =	19

The remainder is 19.

7. Simplify each of the following.

   a. $2.4 \div (1.6 - 0.4) + 0.3 \times 0.7$

   b. $3.2 + 0.8 \div 0.4$

8. Write a number sentence to describe each of the following and then simplify each one.

   a. Add 0.12 and 0.7 and divide the sum by 0.02.

   b. Divide the sum of 0.6 and 0.25 by the difference of these same two numbers.

7. a. $2.4 \div (1.6 - 0.4) + 0.3 \times 0.7$
$= 2.4 \div 1.2 + 0.3 \times 0.7$
$= 2 + 0.21$
$= 2.21$

   b. $3.2 + 0.8 \div 0.4$
$= 3.2 + 2$
$= 5.2$

8. a. $(0.12 + 0.7) \div 0.02$
$= 0.82 \div 0.02$
$= 41$

   b. $(0.6 + 0.25) \div (0.6 - 0.25)$
$= 0.85 \div 0.35$
$= 2.428\,571\,4$
$\doteq 2.4$

GETTING SET

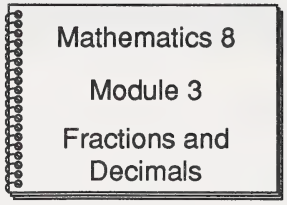
What Lies Ahead

This section will test these skills.

- interpreting a fraction
- writing equivalent fractions
- writing basic fractions
- writing mixed numbers as improper fractions
- writing improper fractions as mixed numbers
- expressing a fraction as a decimal number
- expressing terminating decimals as fractions
- comparing fractions
- estimating sums, differences, products, and quotients
- computing sums, differences, products, and quotients using paper and pencil methods and using a calculator
- computing sums, differences, products, and quotients mentally
- performing a series of operations

Gathering Materials

For this section the student will need these items.

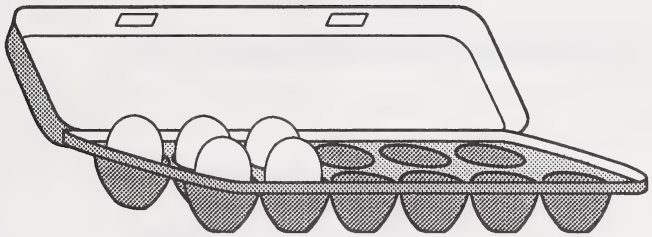


Guiding the Student

- Emphasize to the students that the goal of this section is to determine their strengths and weaknesses.
- Help the students check their answers to the pretest. It is not necessary to correct errors at this time. See the last page of this section for further directions.

Pretest

1. What fraction of this carton of eggs is full?



2. a. Write an equivalent fraction for $\frac{7}{9}$.

   b. Find the basic fraction for $\frac{14}{21}$.

   c. Express $\frac{75}{13}$ as a mixed number.

   d. Express $2\frac{1}{8}$ as an improper fraction.

   e. Express $\frac{4}{125}$ as a terminating decimal.

   f. Express $\frac{5}{9}$ as a repeating decimal.

   g. Express 0.135 as a fraction.

   h. Will $\frac{9}{14}$ produce a terminating decimal or a repeating decimal?

Suggested Answers

1. $\frac{5}{12}$

2. a. $\frac{7}{9} = \frac{14}{18} = \frac{21}{27} = \frac{28}{36}, \ldots$

   b. $\frac{14}{21} = \frac{2}{3}$

   c. $\frac{75}{13} = 5\frac{10}{13}$

   d. $2\frac{1}{8} = \frac{17}{8}$

   e. $\frac{4}{125} = \frac{32}{1000} = 0.032$

   f. $\frac{5}{9} = 0.\dot{5}$

   g. $0.135 = \frac{135}{1000} = \frac{27}{100}$

   h. $\frac{9}{14}$ will produce a repeating decimal.

3. Arrange these fractions in **descending order** from greatest to least.

$\frac{5}{8}, \frac{7}{10}, \frac{3}{4}, \frac{1}{2}, \frac{11}{20}$

4. Estimate the following sums or differences and then calculate the exact answers. Do not use a calculator. Express each answer in simplest form.

a. $\frac{5}{8} + \frac{2}{8}$

b. $\frac{3}{6} - \frac{1}{6}$

c. $1\frac{1}{10} + 2\frac{3}{10}$

d. $2\frac{3}{5} - 1\frac{4}{5}$

3. $\frac{1}{2} < \frac{11}{20} < \frac{5}{8} < \frac{7}{10} < \frac{3}{4}$

4. Estimates will vary. Exact answers are given.

a. $\frac{7}{8}$

b. $\frac{1}{3}$

c. $3\frac{2}{5}$

d. $\frac{4}{5}$

5. Estimate the following sums and differences and then calculate the exact answers. Do not use a calculator. Express the answers in simplest form.

   a. $\frac{3}{5} + \frac{1}{4}$

   b. $\frac{7}{8} - \frac{3}{4}$

   c. $1\frac{1}{6} + 2\frac{4}{9}$

   d. $3\frac{3}{10} - 1\frac{2}{5}$

6. Compute the following operations mentally. Express the answers in simplest form.

   a. $4\frac{3}{8} + 2\frac{7}{8}$

   b. $2\frac{1}{4} - 1\frac{3}{4}$

   c. $1\frac{1}{3} + 5\frac{7}{9}$

   d. $3\frac{1}{5} - 1\frac{9}{10}$

5. Estimates will vary. Exact answers are given.

   a. $\frac{17}{20}$

   b. $\frac{1}{8}$

   c. $3\frac{11}{18}$

   d. $1\frac{9}{10}$

6. a. $7\frac{1}{4}$

   b. $\frac{1}{2}$

   c. $7\frac{1}{9}$

   d. $1\frac{3}{10}$

7. Estimate the following products and then calculate the exact answers. Do not use a calculator. Express the answers in simplest form.

   a. $\frac{1}{5} \times \frac{1}{6}$

   b. $\frac{3}{7} \times \frac{5}{8}$

   c. $1\frac{3}{4} \times 2\frac{1}{3}$

   d. $1\frac{2}{3} \times 1\frac{3}{4}$

8. Multiply each of the following. Use cancelling where possible. Express the answers in simplest form.

   a. $\frac{7}{8} \times \frac{2}{5}$

   b. $\frac{3}{4} \times \frac{8}{9}$

   c. $1\frac{1}{2} \times 1\frac{5}{6}$

   d. $2\frac{7}{9} \times 3\frac{3}{5}$

9. Multiply mentally to obtain the exact answers. Express the answers in simplest form.

   a. $4 \times 3\frac{1}{2}$

   b. $\frac{1}{2} \times 2\frac{4}{5}$

   c. $3\frac{1}{2} \times 2\frac{2}{3}$

7. Estimates will vary. Exact answers are given.

   a. $\frac{1}{30}$

   b. $\frac{15}{56}$

   c. $4\frac{1}{12}$

   d. $2\frac{11}{12}$

8. a. $\frac{7}{20}$

   b. $\frac{2}{3}$

   c. $2\frac{3}{4}$

   d. 10

9. a. 14

   b. $1\frac{2}{5}$

   c. $9\frac{1}{3}$

10. Estimate the following quotients and then calculate the exact answers. Do not use calculators. Express the answers in simplest form.

    a. $\frac{3}{5} \div \frac{1}{5}$

    b. $\frac{2}{3} \div 2$

    c. $\frac{3}{4} \div \frac{3}{8}$

    d. $\frac{4}{5} \div \frac{1}{2}$

    e. $1\frac{3}{4} \div \frac{1}{4}$

    f. $2\frac{1}{3} \div 1\frac{1}{2}$

11. Write the reciprocals of each of the following fractions.

    a. $\frac{2}{5}$

    b. 3

    c. $1\frac{1}{3}$

10. Estimates will vary. Exact answers are given.

    a. 3

    b. $\frac{1}{3}$

    c. 2

    d. $1\frac{3}{5}$

    e. 7

    f. $1\frac{5}{9}$

11. a. $\frac{5}{2}$

    b. $\frac{1}{3}$

    c. $\frac{3}{4}$

12. Two numbers are reciprocals of each other. One number is 16 times larger than the other. Find the two numbers.

13. Mentally divide each of the following. Express each answer in simplest form.

    a. $6\frac{3}{8} \div 3$

    b. $8\frac{4}{5} \div 3$

    c. $5\frac{1}{3} \div 5$

14. Find the following sums. Use shortcuts. Express each answer in simplest form.

    a. $\frac{3}{7} + \frac{1}{4} + \frac{2}{7} + \frac{3}{4}$

    b. $\frac{1}{3} + \frac{2}{5} + \frac{3}{10} + \frac{1}{6}$

15. Find the following products. Use shortcuts. Express each answer in simplest form.

    a. $\frac{2}{3} \times \frac{4}{5} \times \frac{5}{7} \times \frac{1}{8}$

    b. $1\frac{1}{8} \times 3\frac{3}{4} \times 1\frac{1}{3} \times 1\frac{3}{5}$

12. Use guess, check, and revise methods.

    The numbers are 4 and $\frac{1}{4}$.

13. a. $2\frac{1}{8}$

    b. $2\frac{14}{15}$

    c. $1\frac{1}{15}$

14. a. $1\frac{5}{7}$

    b. $1\frac{1}{5}$

15. a. $\frac{1}{21}$

    b. 9

16. Simplify each of the following. Express each answer in simplest form.

    a. $\frac{1}{2} + \frac{3}{4} \times \frac{5}{9}$

    b. $\frac{2}{3} \times \frac{3}{4} - \frac{1}{2} \times \frac{2}{3}$

    c. $\left(1\frac{1}{3} + \frac{7}{9}\right) \div \frac{2}{9}$

17. Solve the following problems. You may use a calculator if you wish, but give accurate answers. Express each answer in simplest form.

    a. Shelley watched television for $\frac{3}{4}$ h and she studied for $\frac{1}{3}$ h. How much time did she spend doing the two activities?

    b. It takes John $1\frac{3}{4}$ minutes to swim a length of the pool. How many lengths can he swim in 14 minutes?

16. a. $\frac{11}{12}$

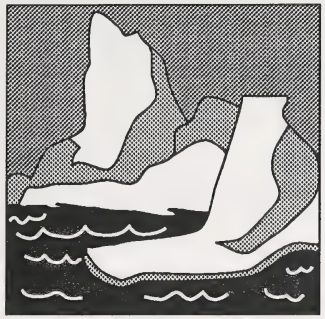
    b. $\frac{1}{6}$

    c. $9\frac{1}{2}$

17. a. Shelley spent $1\frac{1}{12}$ h doing the two activities.

    b. John can swim 8 lengths in 14 minutes.

c. An iceberg has a volume of 200 m^3. If $\frac{1}{8}$ of the iceberg is above the surface of the water, how many cubic metres of the iceberg are above the surface?



d. Alpha Centauri is $4\frac{1}{3}$ light years away from Earth. Sirius is $8\frac{3}{5}$ light years away from Earth. How much further from Earth is Sirius than Alpha Centauri?

c. 25 m^3 of the iceberg are above water.

d. Sirius is $4\frac{4}{15}$ light years further away from Earth than Alpha Centauri.

Guiding the Student

Help the students decide what to do next. It is recommended that students review the notes in the sections which correspond to the questions with which they experienced success, and that the students do a few sample questions from the activities.

It is recommended that students carefully study the notes in the sections which correspond to the questions with which they experienced difficulties, and that students do most of the questions in the activities.

Questions	Skills	Sections
1.	interpreting a fraction	3
2.a.	finding equivalent fractions	3
2.b.	finding the basic fraction	3
2.c., d.	expressing mixed numbers as improper fractions and vice versa	3
2.e., f., g., h.	expressing fractions as decimal numbers and vice versa	4
3.	comparing and ordering fractions	5
4., 5., 17.a., d.	estimating and computing sums and differences with fractions and mixed numbers	6, 7
6.	mental computation of sums and differences	8
7., 17.b.	estimating and computing products with fractions and mixed numbers	9
8.	using cancelling techniques	10
9.	mental computation of products	11
10., 11.	writing reciprocals	13
12., 17.c.	estimating and computing quotients	12, 13
13.	mental computation of quotients	14
14.	performing a series of sums	15
15.	performing a series of products	16
16.	using rules for order of operations	17

INTERPRETING FRACTIONS

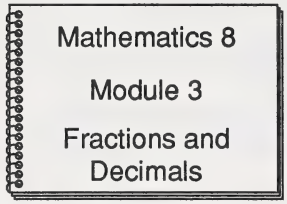
What Lies Ahead

In this section the student will learn these skills.

- interpreting a fraction
- writing equivalent fractions
- writing basic fractions
- writing mixed numbers as improper fractions
- writing improper fractions as mixed numbers

Gathering Materials

For this section the student will need these items.



Computer Drill and Instruction: Mathematics, Level D (SRA)

(optional)

2 pages of blank paper
popsicle sticks or tongue depressors

Guiding the Student

- Emphasize to the students that the goal of this section is to review some of the basic skills with fractions.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Practice Activities

1. Label each part of the fraction. What is Part a called? What is Part b called?

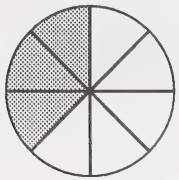
$$\frac{6}{10} \quad \begin{matrix} \leftarrow a \\ \leftarrow b \end{matrix}$$

2. a. What does Part a in Question 1 show?

   b. What does Part b in Question 1 show?

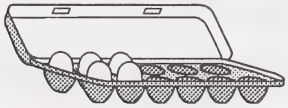
3. For each of the following diagrams, write a fraction to describe the part of the whole being represented.

a.

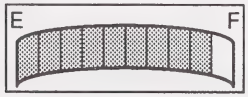


b.

c.



d.



Suggested Answers

1. Part a is the numerator. Part b is the denominator.

2. a. The numerator shows the number of parts being considered.

   b. The denominator shows the total number of parts.

3. a. $\frac{3}{8}$

   b. $\frac{3}{4}$

   c. $\frac{5}{12}$

   d. $\frac{9}{10}$

4. Find three equivalent fractions for each of the following basic fractions.

   a. $\frac{1}{2}$

   b. $\frac{2}{3}$

   c. $\frac{3}{5}$

   d. $\frac{7}{10}$

5. Find the basic fraction for each of these unsimplified forms.

   a. $\frac{30}{45}$

   b. $\frac{16}{40}$

   c. $\frac{75}{100}$

   d. $\frac{12}{36}$

4. a. $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$, ...

   b. $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12} = \frac{10}{15}$, ...

   c. $\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{12}{20} = \frac{15}{25}$, ...

   d. $\frac{7}{10} = \frac{14}{20} = \frac{21}{30} = \frac{28}{40} = \frac{35}{50}$, ...

5. a. $\frac{2}{3}$

   b. $\frac{2}{5}$

   c. $\frac{3}{4}$

   d. $\frac{1}{3}$

6. Express each of these improper fractions as a mixed number. Make sure that the fraction part is expressed as a basic fraction.

   a. $\frac{45}{30}$

   b. $\frac{40}{16}$

   c. $\frac{100}{75}$

   d. $\frac{38}{12}$

7. Express each of these improper fractions as a mixed number.

   a. $\frac{10}{3}$

   b. $\frac{16}{7}$

   c. $\frac{21}{4}$

   d. $\frac{33}{2}$

6. a. $1\frac{1}{2}$

   b. $2\frac{1}{2}$

   c. $1\frac{1}{3}$

   d. $3\frac{1}{6}$

7. a. $3\frac{1}{3}$

   b. $2\frac{2}{7}$

   c. $20\frac{1}{4}$

   d. $16\frac{1}{2}$

8. Express each of these mixed numbers as an improper fraction.

a. $5\frac{1}{4}$

b. $3\frac{2}{5}$

c. $2\frac{1}{3}$

d. $4\frac{3}{5}$

8. a. $\frac{21}{4}$

b. $\frac{17}{5}$

c. $\frac{7}{3}$

d. $\frac{23}{5}$

Extra Practice

Make number lines and multiple bars like those on the previous pages. Use these number lines and multiple bars to answer Questions 1 and 2.

1. Use the number lines or the multiple bars to find two equivalent fractions for each of the following.

   a. $\frac{1}{6}$

   b. $\frac{3}{4}$

   c. $\frac{7}{8}$

   d. $\frac{1}{9}$

2. Use number lines or multiple bars to find the basic fraction for each of the following.

   a. $\frac{6}{12}$

   b. $\frac{4}{8}$

   c. $\frac{20}{35}$

   d. $\frac{48}{64}$

Suggested Answers

1. a. $\frac{1}{6} = \frac{2}{12} = \frac{3}{18} = \frac{4}{24} = \frac{5}{30}$, ...

   b. $\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \frac{15}{20}$, ...

   c. $\frac{7}{8} = \frac{14}{16} = \frac{21}{24} = \frac{28}{32} = \frac{35}{40}$, ...

   d. $\frac{1}{9} = \frac{2}{18} = \frac{3}{27} = \frac{4}{36} = \frac{5}{45}$, ...

2. a. $\frac{1}{2}$

   b. $\frac{1}{2}$

   c. $\frac{4}{7}$

   d. $\frac{3}{4}$

3. Rewrite each of the following improper fractions as a mixed number.

   a. $\frac{77}{8}$

   b. $\frac{31}{4}$

   c. $\frac{36}{7}$

   d. $\frac{23}{5}$

4. Rewrite each of the following mixed numbers as an improper fraction.

   a. $2\frac{3}{5}$

   b. $3\frac{7}{8}$

   c. $1\frac{4}{9}$

   d. $2\frac{3}{10}$

3. a. $9\frac{5}{8}$

   b. $7\frac{3}{4}$

   c. $5\frac{1}{7}$

   d. $4\frac{3}{5}$

4. a. $\frac{13}{5}$

   b. $\frac{31}{8}$

   c. $\frac{13}{9}$

   d. $\frac{23}{10}$

Computer Alternative

5. Do Lessons 2, 3, and 4 of the Fraction disk from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA). If you need help or make errors, remember to hold down the SHIFT key and press the ? key.

5. Computer corrected

Concluding Activities

1. Use a calculator to write the mixed number for each of these improper fractions.

   a. $\frac{125}{8}$

   b. $\frac{87}{5}$

   c. $\frac{77}{2}$

   d. $\frac{215}{7}$

   e. $\frac{312}{9}$

2. Use a calculator to change each of these mixed numbers to an improper fraction.

   a. $7\frac{7}{12}$

   b. $4\frac{9}{16}$

   c. $3\frac{24}{25}$

   d. $2\frac{33}{64}$

Suggested Answers

1. a. $15\frac{5}{8}$

   b. $17\frac{2}{5}$

   c. $38\frac{1}{2}$

   d. $30\frac{5}{7}$

   e. $34\frac{2}{3}$

2. a. $\frac{91}{12}$

   b. $\frac{73}{16}$

   c. $\frac{99}{25}$

   d. $\frac{161}{64}$

FRACTIONS AND DECIMAL NUMBERS

What Lies Ahead

In this section the student will learn these skills.

- expressing a fraction as a decimal number
- expressing a terminating decimal number as a fraction

Gathering Materials

For this section the student will need these items.

Mathematics 8

Module 3

Fractions and Decimals

Guiding the Student

- Emphasize to the students that the goal of this section is to review how to convert a fraction to its decimal form and vice versa.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Practice Activities

1. Express each of these decimal numbers as a fraction in simplest form.

   a. 0.875

   b. 0.3

   c. 0.26

   d. 0.036

   e. 0.05

2. Express each of these fractions as a terminating decimal number.

   a. $\frac{1}{8}$

   b. $\frac{23}{25}$

   c. $\frac{3}{4}$

   d. $\frac{3}{125}$

Suggested Answers

1. a. $\frac{7}{8}$

   b. $\frac{3}{10}$

   c. $\frac{13}{50}$

   d. $\frac{9}{250}$

   e. $\frac{1}{20}$

2. a. 0.125

   b. 0.92

   c. 0.75

   d. 0.024

3. If each if these fractions is expressed as a repeating decimal number, what is the maximum number of digits in the repeating block?

   a. $\frac{7}{9}$

   b. $\frac{5}{12}$

   c. $\frac{9}{11}$

   d. $\frac{2}{13}$

4. Write each of the fractions in Question 3 as repeating decimal numbers. Use the dot or bar notation.

3. a. 8

   b. 11

   c. 10

   d. 12

4. a. $0.\dot{7}$ or $0.\overline{7}$

   b. $0.41\dot{6}$ or $0.41\overline{6}$

   c. $0.\dot{8}\dot{1}$ or $0.\overline{81}$

   d. $0.\dot{1}53\ 84\dot{6}$ or $0.\overline{153\ 846}$

Concluding Activities

1. Some fractions will result in terminating decimal numbers. Here are some examples.

   a. $\frac{1}{8} = 0.875$

   b. $\frac{3}{20} = 0.15$

   c. $\frac{2}{5} = 0.4$

   d. $\frac{1}{50} = 0.02$

   Express the denominator of each fraction as a product of prime factors.

2. Some fractions will result in repeating decimal numbers. Here are some examples.

   a. $\frac{9}{11} = 0.\dot{8}\dot{1}$

   b. $\frac{7}{12} = 0.58\dot{3}$

   c. $\frac{5}{18} = 0.2\dot{7}$

   d. $\frac{2}{13} = 0.\dot{1}53\,846\dot{}$

   Express the denominator of each fraction as a product of prime factors.

Suggested Answers

1. a. $8 = 2 \times 2 \times 2$

   b. $20 = 2 \times 2 \times 5$

   c. $5 = 5$

   d. $50 = 2 \times 5 \times 5$

2. a. $11 = 11$

   b. $12 = 2 \times 2 \times 3$

   c. $18 = 2 \times 3 \times 3$

   d. $13 = 13$

3. a. Compare the prime factors in Questions 1 and 2. What do you notice?

   b. State a rule which can be used to determine if a fraction will result in a terminating decimal number.

4. Use the rule you discovered in Question 3 to determine if each of the following fractions will result in a terminating or repeating decimal number.

   a. $\frac{11}{12}$

   b. $\frac{1}{16}$

   c. $\frac{8}{125}$

   d. $\frac{9}{40}$

   e. $\frac{10}{49}$

5. a. Look at the prime factors in Question 1. Compare the number of 2s and the number of 5s to the number of decimal places. What do you notice?

   b. State a rule which can be used to determine the number of decimal places in the terminating decimal that will result when a fraction is changed to a decimal number.

3. a. The only prime factors in Question 1 were 2s and 5s. There were other prime factors in Question 2.

   b. If the denominator has only the prime factors 2 or 5, the fraction will produce a terminating decimal.

4. a. $12 = 2 \times 2 \times 3$ It will be a repeating decimal number.

   b. $16 = 2 \times 2 \times 2 \times 2$ It will be a terminating decimal number.

   c. $125 = 5 \times 5 \times 5$ It will be a terminating decimal number.

   d. $40 = 2 \times 2 \times 2 \times 5$ It will be a terminating decimal number.

   e. $49 = 7 \times 7$ It will be a repeating decimal number.

5. a. There is **one** 5 in 5, and $\frac{2}{5}$ has **one** decimal place.

   There are **three** 2s in 8, and $\frac{1}{8}$ has **three** decimal places.

   There are **two** 2s in 20, and $\frac{3}{20}$ has **two** decimal places.

   There are **two** 5s in 50, and $\frac{1}{50}$ has **two** decimal places.

   b. The fraction will have the same number of decimal places as the greatest number of one prime factor.

6. Use the rule you discovered in Question 5 to decide how many decimal places there will be when each of these fractions is changed to a terminating decimal number.

   a. $\frac{4}{25}$

   b. $\frac{5}{8}$

   c. $\frac{3}{50}$

   d. $\frac{1}{40}$

   e. $\frac{1}{200}$

6. a. $25 = 5 \times 5$

   There are **two** 5s, so $\frac{4}{25}$ will have **two** decimal places.

   b. $8 = 2 \times 2 \times 2$

   There are **three** 2s, so $\frac{5}{8}$ will have **three** decimal places.

   c. $50 = 2 \times 5 \times 5$

   There are **two** 5s, so $\frac{3}{50}$ will have **two** decimal places.

   d. $40 = 2 \times 2 \times 2 \times 5$

   There are **three** 2s, so $\frac{1}{40}$ will have **three** decimal places.

   e. $200 = 2 \times 2 \times 2 \times 5 \times 5$

   There are **three** 2s, so $\frac{1}{200}$ will have **three** decimal places.

COMPARING FRACTIONS

What Lies Ahead

In this section the student will review these skills.

- comparing fractions with common numerators
- comparing fractions with common denominators

Gathering Materials

For this section the student will need these items.

Mathematics 8

Module 3

Fractions and Decimals

Guiding the Student

- Emphasize to the students that the goal of this section is to compare fractions.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Practice Activities

1. Use < or > to show which fraction is the larger of the two.

   a. $\frac{5}{8}$ ● $\frac{3}{8}$

   b. $\frac{9}{7}$ ● $\frac{11}{7}$

   c. $\frac{7}{10}$ ● $\frac{9}{10}$

2. Use < or > to show which fraction is the larger of the two.

   a. $\frac{4}{11}$ ● $\frac{4}{5}$

   b. $\frac{3}{8}$ ● $\frac{3}{10}$

   c. $\frac{1}{2}$ ● $\frac{1}{3}$

3. Use < or > to show which fraction is the larger of the two.

   a. $\frac{2}{5}$ ● $\frac{3}{7}$

   b. $\frac{7}{9}$ ● $\frac{2}{3}$

   c. $\frac{3}{4}$ ● $\frac{4}{5}$

Suggested Answers

1. a. $\frac{5}{8} > \frac{3}{8}$

   b. $\frac{9}{7} < \frac{11}{7}$

   c. $\frac{7}{10} < \frac{9}{10}$

2. a. $\frac{4}{11} < \frac{4}{5}$

   b. $\frac{3}{8} > \frac{3}{10}$

   c. $\frac{1}{2} > \frac{1}{3}$

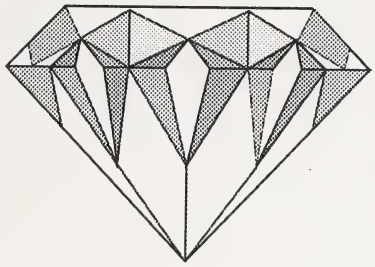
3. a. $\frac{2}{5} < \frac{3}{7}$

   b. $\frac{7}{9} > \frac{2}{3}$

   c. $\frac{3}{4} < \frac{4}{5}$

4. If it took Marnee $\frac{1}{2}$ of an hour to do this section of the course and Darwin did it in $\frac{3}{4}$ of an hour, which person needed more time to complete the work?

5. Sue, Bill, and Micky bought diamonds at Jill's Jewellery. Sue bought a $\frac{1}{2}$ carat diamond, Bill bought a $\frac{5}{8}$ carat diamond, and Micky bought a $\frac{2}{3}$ carat diamond. Which of the three people bought the biggest diamond?



4. $\frac{1}{2} < \frac{3}{4}$

Darwin needed more time to complete the work.

5. $\frac{1}{2} = \frac{12}{24}$, $\frac{5}{8} = \frac{15}{24}$, $\frac{2}{3} = \frac{16}{24}$

$\frac{12}{24} < \frac{15}{24} < \frac{16}{24}$

So, $\frac{1}{2} < \frac{5}{8} < \frac{2}{3}$

Micky bought the biggest diamond.

Concluding Activities

Use cross products to mentally compare each of the following pairs of fractions.

1. $\frac{4}{5}, \frac{7}{9}$

2. $\frac{7}{9}, \frac{6}{7}$

3. $\frac{2}{3}, \frac{6}{7}$

4. $\frac{4}{7}, \frac{1}{2}$

5. $\frac{2}{3}, \frac{4}{6}$

Suggested Answers

1. $\frac{4}{5} > \frac{7}{9}$

2. $\frac{7}{9} > \frac{6}{7}$

3. $\frac{2}{3} < \frac{6}{7}$

4. $\frac{4}{7} > \frac{1}{2}$

5. $\frac{2}{3} = \frac{4}{6}$

ADDING AND SUBTRACTING FRACTIONS WITH LIKE DENOMINATORS

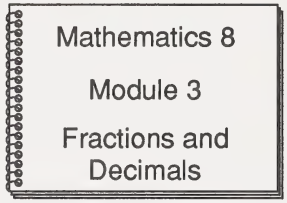
What Lies Ahead

In this section the student will learn these skills.

- adding fractions and mixed numbers with like denominators
- subtracting fractions and mixed numbers with like denominators

Gathering Materials

For this section the student will need these items.



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MATHWORKS: Adding and Subtracting Fractions and Mixed Numbers with Like Denominators (Agency for Instructional Television)

Guiding the Student

- Emphasize to the students that the goal of this section is to add and subtract fractions with like denominators.
- Help the students decide what to do in this section.
- You may also wish to use segments of *MATH MOVES: Adding and Subtracting Fractions* (ACCESS).
- Help the students to check their answers to the activities in this section and correct any errors.

Introductory Activities

1. Add each of the following. Express all final answers in simplest form.

   a. $\frac{2}{9} + \frac{6}{9}$

   b. $\frac{6}{11} + \frac{3}{11}$

   c. $\frac{3}{20} + \frac{13}{20}$

   d. $2\frac{2}{5} + 1\frac{1}{5}$

   e. $2\frac{1}{10} + 3\frac{7}{10}$

   f. $4\frac{5}{9} + 6\frac{1}{9}$

Suggested Answers

1. a. $\frac{8}{9}$

   b. $\frac{9}{11}$

   c. $\frac{4}{5}$

   d. $3\frac{3}{5}$

   e. $5\frac{4}{5}$

   f. $10\frac{2}{3}$

2. Subtract each of the following. Express all final answers in simplest form.

a. $\frac{7}{8} - \frac{5}{8}$

b. $\frac{4}{5} - \frac{1}{5}$

c. $\frac{6}{7} - \frac{3}{7}$

d. $1\frac{13}{100} - \frac{9}{100}$

e. $3\frac{5}{6} - 1\frac{2}{6}$

f. $16\frac{7}{9} - 4\frac{4}{9}$

2. a. $\frac{1}{4}$

b. $\frac{3}{5}$

c. $\frac{3}{7}$

d. $1\frac{1}{25}$

e. $2\frac{1}{2}$

f. $12\frac{1}{3}$

Practice Activities

1. Add each of the following. Express all final answers in simplest form.

   a. $1\frac{3}{5} + 2\frac{4}{5}$

   b. $2\frac{5}{6} + 1\frac{1}{6}$

   c. $3\frac{3}{4} + 2\frac{3}{4}$

   d. $5\frac{7}{8} + 2\frac{3}{8}$

   e. $1\frac{5}{12} + 5\frac{11}{12}$

2. Subtract each of the following. Express all final answers in simplest form.

   a. $4\frac{5}{8} - 1\frac{3}{8}$

   b. $2\frac{1}{4} - 1\frac{3}{4}$

   c. $3\frac{2}{5} - 1\frac{3}{5}$

   d. $4\frac{7}{12} - 2\frac{11}{12}$

   e. $2\frac{1}{10} - \frac{7}{10}$

Suggested Answers

1. a. $4\frac{2}{5}$

   b. 4

   c. $6\frac{1}{2}$

   d. $8\frac{1}{4}$

   e. $7\frac{1}{3}$

2. a. $3\frac{1}{4}$

   b. $\frac{1}{2}$

   c. $1\frac{4}{5}$

   d. $1\frac{2}{3}$

   e. $1\frac{2}{5}$

Extra Practice

1. Add each of the following. Express all final answers in simplest form.

   a. $\frac{3}{8} + \frac{3}{8}$

   b. $\frac{3}{7} + \frac{2}{7}$

   c. $\frac{4}{9} + \frac{7}{9}$

   d. $\frac{3}{10} + \frac{7}{10}$

   e. $3\frac{1}{5} + 1\frac{3}{5}$

   f. $4\frac{3}{8} + 5\frac{7}{8}$

   g. $1\frac{3}{5} + 2\frac{4}{5}$

   h. $2\frac{7}{8} + 1\frac{3}{8}$

Suggested Answers

1. a. $\frac{3}{4}$

   b. $\frac{5}{7}$

   c. $1\frac{2}{9}$

   d. 1

   e. $4\frac{4}{5}$

   f. $10\frac{1}{4}$

   g. $4\frac{2}{5}$

   h. $4\frac{1}{4}$

2. Subtract each of the following. Express all final answers in simplest form.

a. $\frac{3}{4} - \frac{1}{4}$

b. $\frac{5}{8} - \frac{3}{8}$

c. $\frac{7}{9} - \frac{2}{9}$

d. $1\frac{3}{10} - \frac{7}{10}$

e. $3\frac{3}{5} - 1\frac{1}{5}$

f. $2\frac{7}{8} - 1\frac{5}{8}$

g. $2\frac{1}{4} - 1\frac{3}{4}$

h. $3\frac{2}{7} - 1\frac{5}{7}$

2. a. $\frac{1}{2}$

b. $\frac{1}{4}$

c. $\frac{5}{9}$

d. $\frac{3}{5}$

e. $2\frac{2}{5}$

f. $1\frac{1}{4}$

g. $\frac{1}{2}$

h. $1\frac{4}{7}$

3. Jane listened to her radio for one hour or 60 minutes. She discovered that music was on for $\frac{35}{60}$ of the time, news used $\frac{5}{60}$ of the time, weather was given for $\frac{2}{60}$ of the time, sports highlights were reported for $\frac{3}{60}$ of the time, and commercials used up $\frac{15}{60}$ of the total time.

   a. What fraction of the total time was used for news, weather, and sports?

   b. How much more time was used for playing music than for advertising?

3. a. $\frac{1}{6}$ of the time was used for news, weather, and sports.

   b. $\frac{1}{3}$ more time was used for playing music than for advertising.

4. Melody had a jewellery collection that she wanted to share with her sisters. She decided to give $\frac{3}{10}$ of the collection to Judy and $\frac{5}{10}$ to June.

   a. How much of her jewellery collection did Melody give away?

   b. How much of the collection did she have left for herself?

4. a. Melody gave away $\frac{4}{5}$ of her jewellery collection.

   b. She had $\frac{1}{5}$ of the collection left for herself.

Concluding Activities

Tell whether each of the following is a subtraction magic square.

1.

$\frac{6}{8}$	$\frac{10}{8}$	$\frac{8}{8}$
$\frac{4}{8}$	$\frac{6}{8}$	$\frac{8}{8}$
$\frac{2}{8}$	$\frac{2}{8}$	$\frac{4}{8}$

2.

$\frac{6}{9}$	$\frac{3}{9}$	$\frac{12}{9}$
$\frac{9}{9}$	$\frac{15}{9}$	$\frac{21}{9}$
$\frac{18}{9}$	$\frac{27}{9}$	$\frac{24}{9}$

Suggested Activities

1. Row 1: $\frac{6}{8} + \frac{8}{8} = \frac{14}{8}$; $\frac{14}{8} - \frac{10}{8} = \frac{4}{8}$

   Row 2: $\frac{4}{8} + \frac{8}{8} = \frac{12}{8}$; $\frac{12}{8} - \frac{6}{8} = \frac{6}{8}$

   Row 3: $\frac{2}{8} + \frac{4}{8} = \frac{6}{8}$; $\frac{6}{8} - \frac{2}{8} = \frac{4}{8}$

   Column 1: $\frac{6}{8} + \frac{2}{8} = \frac{8}{8}$; $\frac{8}{8} - \frac{4}{8} = \frac{4}{8}$

   Column 2: $\frac{10}{8} + \frac{2}{8} = \frac{12}{8}$; $\frac{12}{8} - \frac{6}{8} = \frac{6}{8}$

   Column 3: $\frac{8}{8} + \frac{4}{8} = \frac{12}{8}$; $\frac{12}{8} - \frac{8}{8} = \frac{4}{8}$

   This is not a magic square.

2. Row 1: $\frac{6}{9} + \frac{12}{9} = \frac{18}{9}$; $\frac{18}{9} - \frac{3}{9} = \frac{15}{9}$

   Row 2: $\frac{9}{9} + \frac{21}{9} = \frac{30}{9}$; $\frac{30}{9} - \frac{15}{9} = \frac{15}{9}$

   Row 3: $\frac{18}{9} + \frac{24}{9} = \frac{42}{9}$; $\frac{42}{9} - \frac{27}{9} = \frac{15}{9}$

   Column 1: $\frac{6}{9} + \frac{18}{9} = \frac{24}{9}$; $\frac{24}{9} - \frac{9}{9} = \frac{15}{9}$

   Column 2: $\frac{3}{9} + \frac{27}{9} = \frac{30}{9}$; $\frac{30}{9} - \frac{15}{9} = \frac{15}{9}$

   Column 3: $\frac{12}{9} + \frac{24}{9} = \frac{36}{9}$; $\frac{36}{9} - \frac{21}{9} = \frac{15}{9}$

   This is a magic square.

3.

$\frac{1}{6}$	$\frac{2}{6}$	$\frac{4}{6}$
$\frac{3}{6}$	$\frac{5}{6}$	$\frac{5}{6}$
$\frac{6}{6}$	$\frac{11}{6}$	$\frac{8}{6}$

3. Row 1: $\frac{1}{6} + \frac{4}{6} = \frac{5}{6}$; $\frac{5}{6} - \frac{2}{6} = \frac{3}{6}$

Row 2: $\frac{3}{6} + \frac{5}{6} = \frac{8}{6}$; $\frac{8}{6} - \frac{5}{6} = \frac{3}{6}$

Row 3: $\frac{6}{6} + \frac{8}{6} = \frac{14}{6}$; $\frac{14}{6} - \frac{11}{6} = \frac{3}{6}$

Column 1: $\frac{1}{6} + \frac{6}{6} = \frac{7}{6}$; $\frac{7}{6} - \frac{3}{6} = \frac{4}{6}$

Column 2: $\frac{2}{6} + \frac{11}{6} = \frac{13}{6}$; $\frac{13}{6} - \frac{5}{6} = \frac{8}{6}$

Column 3: $\frac{4}{6} + \frac{8}{6} = \frac{12}{6}$; $\frac{12}{6} - \frac{5}{6} = \frac{7}{6}$

This is not a magic square.

ADDING AND SUBTRACTING FRACTIONS WITH UNLIKE DENOMINATORS

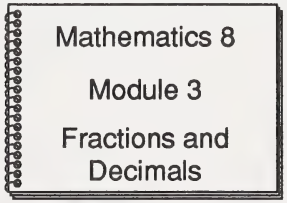
What Lies Ahead

In this section the student will learn these skills.

- estimating sums and differences of fractions and mixed numbers
- finding sums and differences using paper and pencil methods
- finding sums and differences using calculators

Gathering Materials

For this section the student will need these items.



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- *Conquering Fractions* (MECC)
- *Computer Drill and Instruction: Mathematics, Level D* (SRA)
- *Fraction Hunt* on Disk C of *MAC 6* (Houghton Mifflin)
- *MATHWORKS: Adding and Subtracting Fractions and Mixed Numbers with Unlike Denominators* (Agency for Instructional Television)

Guiding the Student

- Emphasize to the students that the goal of this section is adding and subtracting fractions with unlike denominators.
- Help the students decide what to do in this section.
- In addition to the video cited, you may wish to use segments of *MATH MOVES: Adding and Subtracting Fractions* (ACCESS).
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

1. For each of the following, give an estimate first and then calculate the exact answer. Express all answers in simplest form.

   a. $\frac{1}{8} + \frac{1}{4}$

   b. $\frac{2}{3} + \frac{1}{6}$

   c. $2\frac{1}{3} + \frac{5}{12}$

   d. $3\frac{2}{5} + 4\frac{1}{2}$

   e. $2\frac{3}{8} + 1\frac{1}{4}$

Suggested Answers

1. Estimates will vary. Exact answers are given.

   a. $\frac{3}{8}$

   b. $\frac{5}{6}$

   c. $2\frac{3}{4}$

   d. $7\frac{9}{10}$

   e. $3\frac{5}{8}$

2. For each of the following, give an estimate first and then calculate the exact answer. Express all answers in simplest form.

   a. $\frac{4}{7} - \frac{1}{2}$

   b. $\frac{7}{8} - \frac{1}{4}$

   c. $\frac{1}{2} - \frac{1}{3}$

   d. $3\frac{7}{8} - 1\frac{1}{2}$

   e. $6\frac{7}{9} - 3\frac{2}{3}$

2. Estimates will vary. Exact answers are given.

   a. $\frac{1}{14}$

   b. $\frac{5}{8}$

   c. $\frac{1}{6}$

   d. $2\frac{3}{8}$

   e. $3\frac{1}{9}$

Practice Activities

1. For each of the following, give an estimate first and then calculate the exact answer. Express all answers in simplest form.

   a. $\frac{1}{2} + \frac{1}{4}$

   b. $\frac{5}{8} + \frac{3}{5}$

   c. $\frac{5}{6} + \frac{4}{9}$

   d. $2\frac{4}{5} + 3\frac{7}{10}$

   e. $4\frac{5}{6} + 3\frac{3}{4}$

   f. $2\frac{1}{2} + 5\frac{2}{3}$

2. For each of the following, give an estimate first and then calculate the exact answer. Express all answers in simplest form.

   a. $3\frac{1}{10} - 1\frac{3}{5}$

   b. $4\frac{1}{6} - 1\frac{2}{3}$

   c. $5\frac{5}{6} - \frac{8}{9}$

   d. $1\frac{1}{4} - \frac{1}{2}$

Suggested Answers

1. The estimated answers will vary. The exact answers are given.

   a. $\frac{3}{4}$

   b. $1\frac{9}{40}$

   c. $1\frac{5}{18}$

   d. $6\frac{1}{2}$

   e. $8\frac{7}{12}$

   f. $8\frac{1}{6}$

2. The estimated answers will vary. The exact answers are given.

   a. $1\frac{1}{2}$

   b. $2\frac{1}{2}$

   c. $4\frac{17}{18}$

   d. $\frac{3}{4}$

Extra Practice

Do Question 1 or Questions 2 to 5.

Computer Alternative

1. a. Do adding and subtracting on the disk *Conquering Fractions (+,-)* by MECC. Press [V] to view any of the problems in picture form.

   b. Do Lessons 7, 8, 9, 10, and 11 of the disk *Fractions D* from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

In this program you must type [R] to work step by step on the screen. After pressing [R] , use [→] to move from step to step.

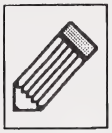
If you wish to do the computation mentally and you simply want to type in the answer, do not press [R] . Press the [→] key to move the cursor to the numerator or to the denominator. Remember to hold down the SHIFT key and press [?] to receive help.

Suggested Answers

1. a. Computer corrected

   b. Computer corrected

Print Alternative



2. Add each of the following. Express all final answers in simplest form.

   a. $\frac{4}{10} + \frac{5}{10}$

   b. $\frac{1}{3} + \frac{3}{10}$

   c. $\frac{3}{8} + \frac{3}{4}$

   d. $1\frac{4}{5} + 3\frac{2}{5}$

   e. $2\frac{5}{6} + 5\frac{1}{2}$

3. Subtract each of the following. Express all final answers in simplest form.

   a. $\frac{5}{6} - \frac{3}{6}$

   b. $\frac{2}{3} - \frac{3}{5}$

   c. $1\frac{3}{4} - 1\frac{1}{4}$

   d. $5\frac{3}{8} - 2\frac{1}{2}$

   e. $10\frac{2}{5} - 8\frac{2}{3}$

2. a. $\frac{9}{10}$

   b. $\frac{19}{30}$

   c. $1\frac{1}{8}$

   d. $5\frac{1}{5}$

   e. $8\frac{1}{3}$

3. a. $\frac{1}{3}$

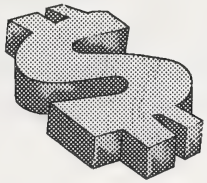
   b. $\frac{1}{15}$

   c. $\frac{1}{2}$

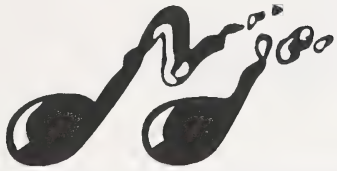
   d. $2\frac{7}{8}$

   e. $2\frac{1}{15}$

4. The Canadian Cancer Society collected $10\frac{1}{2}$ million dollars in a fund-raising drive. The Heart Foundation collected $8\frac{1}{3}$ million dollars. In all, how much money was collected by the two agencies?



5. The Brass Quartet received a $3\frac{1}{2}$ minute ovation. The String Trio received a $4\frac{1}{4}$ minute ovation. How much longer was the String Trio's ovation?



4. $18\frac{5}{6}$ million dollars were collected by the two agencies.

5. The String Trio's ovation was $\frac{3}{4}$ of a minute longer.

Concluding Activities

1. Evaluate the following with a calculator using the $a\frac{b}{c}$ key.

   a. $\frac{1}{8} + \frac{1}{4}$

   b. $\frac{2}{3} - \frac{1}{6}$

   c. $1\frac{1}{2} + \frac{3}{10}$

   d. $1\frac{3}{7} - \frac{3}{4}$

   e. $1\frac{1}{6} + 2\frac{2}{3}$

   f. $3\frac{3}{4} - 2\frac{7}{8}$

Computer Alternative

2. For a fun game of estimation play *Fraction Hunt* on Disk C of MAC 6 (Houghton Mifflin).

Suggested Answers

1. a. $\frac{3}{8}$

   b. $\frac{1}{2}$

   c. $1\frac{4}{5}$

   d. $1\frac{9}{28}$

   e. $3\frac{5}{6}$

   f. $\frac{7}{8}$

2. Computer corrected

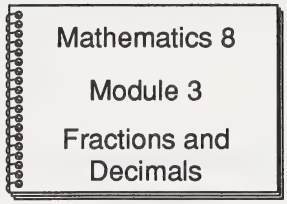
ADDING AND SUBTRACTING MENTALLY

What Lies Ahead

In this section the student will review strategies used to mentally add and subtract whole numbers and extend these strategies to include mentally adding and subtracting fractions and mixed numbers.

Gathering Materials

For this section the student will need these items.



(optional)

- *Solve It: Using Mental Computation for Addition* (AIT)
- *Solve It: Using Mental Computation for Subtraction* (AIT)

Guiding the Student

- Emphasize to the students that the goal of this section is to add and subtract fractions mentally.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

1. Use the plus-minus method to mentally find the exact sums.
   a. 38 + 19
   b. 99 + 48
   c. 38 + 66
   d. 46 + 125
   e. 122 + 218
   f. 828 + 142

2. Use the attention method to mentally find the exact differences.
   a. 56 – 19
   b. 84 – 36
   c. 91 – 53
   d. 146 – 38
   e. 370 – 102
   f. 765 – 215

Suggested Answers

1. a. 57
   b. 147
   c. 104
   d. 171
   e. 340
   f. 970

2. a. 40
   b. 48
   c. 38
   d. 108
   e. 268
   f. 550

Practice Activities

1. Use the plus-minus method to mentally find the sum for each of the following.

   a. $6\frac{3}{8} + 5\frac{7}{8}$

   b. $7\frac{4}{7} + 2\frac{5}{7}$

   c. $7\frac{1}{2} + 1\frac{3}{4}$

   d. $2\frac{5}{9} + 3\frac{2}{3}$

2. Use the attention method to mentally find the difference for each of the following.

   a. $9\frac{2}{5} - 7\frac{4}{5}$

   b. $6\frac{1}{8} - 3\frac{5}{8}$

   c. $8\frac{1}{10} - 6\frac{3}{5}$

   d. $5\frac{1}{2} - 2\frac{3}{4}$

Suggested Answers

1. a. $12\frac{1}{4}$

   b. $10\frac{2}{7}$

   c. $9\frac{1}{4}$

   d. $6\frac{2}{9}$

2. a. $1\frac{3}{5}$

   b. $2\frac{1}{2}$

   c. $1\frac{1}{2}$

   d. $2\frac{3}{4}$

Concluding Activities

Fill the spaces by adding across and subtracting down. The result for the circle must be the same for the addition and the subtraction.

1.

$5\frac{3}{4}$	$2\frac{5}{8}$	
$2\frac{3}{8}$	$1\frac{1}{4}$	
		○

2.

$6\frac{1}{2}$	$4\frac{1}{4}$	
$2\frac{3}{4}$	$3\frac{5}{8}$	
		○

3.

$5\frac{1}{4}$		$7\frac{3}{4}$
	$1\frac{3}{4}$	
		$4\frac{1}{4}$

Suggested Answers

1.

$5\frac{3}{4}$	$2\frac{5}{8}$	$8\frac{3}{8}$
$2\frac{3}{8}$	$1\frac{1}{4}$	$3\frac{5}{8}$
$3\frac{3}{8}$	$1\frac{3}{8}$	$4\frac{3}{4}$

2.

$6\frac{1}{2}$	$4\frac{1}{4}$	$10\frac{3}{4}$
$2\frac{3}{4}$	$3\frac{5}{8}$	$6\frac{3}{8}$
$3\frac{3}{4}$	$\frac{5}{8}$	$4\frac{3}{8}$

3.

$5\frac{1}{4}$	$2\frac{1}{2}$	$7\frac{3}{4}$
$1\frac{3}{4}$	$1\frac{3}{4}$	$3\frac{1}{2}$
$3\frac{1}{2}$	$\frac{3}{4}$	$4\frac{1}{4}$

MULTIPLYING

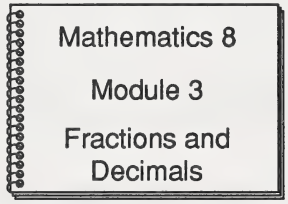
What Lies Ahead

In this section the student will learn these skills.

- estimating products of fractions and mixed numbers
- computing products of fractions and mixed numbers using paper and pencil methods
- computing products of fractions and mixed numbers using a calculator

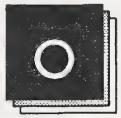
Gathering Materials

For this section the student will need these items.



(optional)

- *Solve It: Multiplication with Fractions and Mixed Numbers* (AIT)



(optional)

- *Conquering Fractions* (MECC)
- *Computer Drill and Instruction: Mathematics, Level D* (SRA)

Guiding the Student

- Emphasize to the students that the goal of this section is multiplying.
- Help the students decide what to do in this section.
- In addition to the video cited, you may wish to use segments of *MATH MOVES: Multiplying and Dividing Fractions* (ACCESS).
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

1. Find the product for each of the following.
   a. 4×6
   b. 3×6
   c. 2×6
   d. 1×6
2. Use the results from Question 1 to make the following prediction. Will $\frac{1}{3} \times 6$ be greater than 6 or less than 6?
3. a. If a number is multiplied by a number greater than 1, will the product be greater than itself, equal to itself, or less than itself?
   b. If a number is multiplied by 1, will the product be greater than itself, equal to itself, or less than itself?
   c. If a number is multiplied by a number less than 1, will the product be greater than itself, equal to itself, or less than itself?

Suggested Answers

1. a. 24
   b. 18
   c. 12
   d. 6
2. $\frac{1}{3} \times 6$ will be less than 6.
3. a. The product will be greater than the number itself.
   b. The product will be equal to the number itself.
   c. The product will be less than the number itself.

Practice Activities

1. Find the product for each of the following. Express all final answers in simplest form.

   a. $3 \times \frac{1}{2}$

   b. $5 \times \frac{2}{3}$

   c. $4 \times \frac{1}{5}$

   d. $20 \times \frac{3}{10}$

2. Find the product for each of the following. Express all final answers in simplest form.

   a. $3 \times 1\frac{1}{4}$

   b. $2 \times 3\frac{1}{6}$

   c. $5 \times 1\frac{2}{3}$

   d. $3 \times \frac{5}{8}$

Suggested Answers

1. a. $\frac{3}{2}$

   b. $3\frac{1}{3}$

   c. $\frac{4}{5}$

   d. 6

2. a. $3\frac{3}{4}$

   b. $6\frac{1}{3}$

   c. $8\frac{1}{3}$

   d. $1\frac{7}{8}$

3. Circle the letter of the question below which will produce a product larger than either of the two factors.

   a. $\frac{1}{5} \times \frac{2}{3}$

   b. $\frac{3}{8} \times 2\frac{1}{4}$

   c. $1\frac{1}{2} \times 3\frac{3}{5}$

4. Circle the letter of the question below which will produce a product smaller than either of the two factors.

   a. $\frac{1}{5} \times \frac{2}{3}$

   b. $\frac{3}{8} \times 2\frac{1}{4}$

   c. $1\frac{1}{2} \times 3\frac{3}{5}$

5. Find the product for each of the following. Express all final answers in simplest form.

   a. $\frac{1}{4} \times \frac{3}{5}$

   b. $\frac{1}{2} \times \frac{1}{6}$

   c. $\frac{1}{5} \times \frac{2}{3}$

   d. $\frac{3}{8} \times \frac{5}{8}$

3. a. $\frac{1}{5} \times \frac{2}{3}$

   b. $\frac{3}{8} \times 2\frac{1}{4}$

   c. $1\frac{1}{2} \times 3\frac{3}{5}$

4. a. $\frac{1}{5} \times \frac{2}{3}$

   b. $\frac{3}{8} \times 2\frac{1}{4}$

   c. $1\frac{1}{2} \times 3\frac{3}{5}$

5. a. $\frac{3}{20}$

   b. $\frac{1}{12}$

   c. $\frac{2}{15}$

   d. $\frac{15}{64}$

6. Find the product for each of the following. Express all final answers in simplest form.

   a. $\frac{2}{3} \times 1\frac{1}{5}$

   b. $\frac{1}{3} \times 2\frac{1}{4}$

   c. $\frac{3}{8} \times 1\frac{1}{2}$

   d. $\frac{1}{4} \times 2\frac{4}{5}$

7. Find the product for each of the following. Express all final answers in simplest form.

   a. $2\frac{1}{2} \times 1\frac{5}{8}$

   b. $3\frac{1}{2} \times 2\frac{4}{5}$

   c. $4\frac{2}{3} \times 1\frac{1}{6}$

   d. $3\frac{1}{4} \times 2\frac{1}{2}$

6. a. $\frac{4}{5}$

   b. $\frac{3}{4}$

   c. $\frac{9}{16}$

   d. $\frac{7}{10}$

7. a. $4\frac{1}{16}$

   b. $9\frac{4}{5}$

   c. $5\frac{4}{9}$

   d. $8\frac{1}{8}$

Extra Practice

Do Questions 1 or 2 and then do Question 3.

Computer Alternative

1. a. Do the multiplying program of the disk *Conquering Fractions* (MECC). Press [v] to view any of the problems in picture form. Do not press [s] at this time.

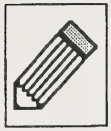
   b. Do Lessons 12, 13, and 14 of the disk *Fractions* from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA). Read the instructions in the folder before using the program. If you need help, remember to hold down the SHIFT key and press the [?] key.

Suggested Answers

1. a. Computer corrected

   b. Computer corrected

Print Alternative



2. Find the product for each of the following. Express all final answers in simplest form.

   a. $2 \times \frac{1}{3}$

   b. $6 \times \frac{2}{5}$

   c. $5 \times \frac{3}{4}$

   d. $5 \times 1\frac{1}{4}$

   e. $2 \times 1\frac{2}{3}$

   f. $3 \times 2\frac{1}{2}$

3. Find the product for each of the following. Express all final answers in simplest form.

   a. $\frac{1}{3} \times \frac{1}{2}$

   b. $\frac{3}{4} \times \frac{3}{5}$

   c. $\frac{4}{5} \times \frac{7}{6}$

   d. $\frac{2}{7} \times \frac{1}{3}$

   e. $\frac{1}{3} \times 2\frac{3}{4}$

2. a. $\frac{2}{3}$

   b. $\frac{12}{5} = 2\frac{2}{5}$

   c. $\frac{15}{4} = 3\frac{3}{4}$

   d. $\frac{25}{4} = 6\frac{1}{4}$

   e. $\frac{10}{3} = 3\frac{1}{3}$

   f. $\frac{15}{2} = 7\frac{1}{2}$

3. a. $\frac{1}{6}$

   b. $\frac{9}{20}$

   c. $\frac{14}{15}$

   d. $\frac{2}{21}$

   e. $\frac{11}{12}$

f. $\frac{2}{3} \times 1\frac{3}{5}$

g. $\frac{4}{7} \times 1\frac{1}{6}$

h. $\frac{1}{3} \times 2\frac{1}{2}$

i. $1\frac{2}{3} \times 2\frac{1}{2}$

j. $1\frac{4}{5} \times 1\frac{1}{2}$

k. $3\frac{1}{2} \times 2\frac{7}{8}$

l. $2\frac{1}{4} \times 3\frac{3}{10}$

f. $\frac{16}{15} = 1\frac{1}{15}$

g. $\frac{2}{3}$

h. $\frac{5}{6}$

i. $\frac{25}{6} = 4\frac{1}{6}$

j. $\frac{27}{10} = 2\frac{7}{10}$

k. $\frac{161}{16} = 10\frac{1}{16}$

l. $\frac{297}{40} = 7\frac{17}{40}$

Concluding Activities

1. Find the product for each of the following. Use a calculator which has the $a\frac{b}{c}$ key.

   a. $\frac{1}{2} \times \frac{7}{10}$

   b. $\frac{2}{3} \times \frac{1}{5}$

   c. $\frac{7}{9} \times \frac{3}{5}$

   d. $1\frac{4}{5} \times 1\frac{2}{3}$

   e. $2\frac{3}{8} \times 5\frac{1}{7}$

Suggested Answers

1. a. $\frac{7}{20}$

   b. $\frac{2}{15}$

   c. $\frac{7}{15}$

   d. 3

   e. $12\frac{3}{14}$

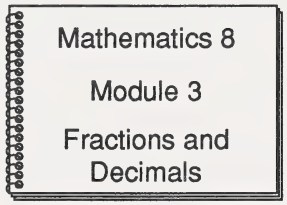
SHORTCUTS TO MULTIPLYING

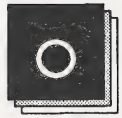
What Lies Ahead

In this section the student will learn cancelling techniques.

Gathering Materials

For this section the student will need these items.





(optional)

- *Conquering Fractions* ($\times$, $\div$) (MECC)
- *Computer Drill and Instruction: Mathematics, Level D* (SRA)

Guiding the Student

- Emphasize to the students that the goal of this section is to learn cancelling techniques.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Practice Activities

Find each of these products. Use all the cancelling possible to simplify the answers.

1. $\frac{2}{3} \times \frac{3}{4}$

2. $\frac{3}{5} \times \frac{5}{8}$

3. $\frac{5}{8} \times \frac{4}{5}$

4. $\frac{2}{3} \times \frac{6}{7}$

5. $\frac{3}{4} \times \frac{7}{12}$

6. $\frac{8}{9} \times \frac{3}{4}$

Suggested Answers

1. $\frac{1}{2}$

2. $\frac{3}{8}$

3. $\frac{1}{2}$

4. $\frac{4}{7}$

5. $\frac{7}{16}$

6. $\frac{2}{3}$

7. $\frac{20}{39} \times \frac{13}{100}$

8. $1\frac{1}{6} \times \frac{3}{8}$

9. $\frac{4}{9} \times 1\frac{1}{2}$

10. $\frac{3}{5} \times 2\frac{2}{9}$

11. $3\frac{1}{3} \times 1\frac{1}{8}$

12. $2\frac{1}{4} \times 7\frac{3}{5}$

7. $\frac{1}{15}$

8. $\frac{7}{16}$

9. $\frac{2}{3}$

10. $1\frac{1}{3}$

11. $3\frac{3}{4}$

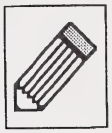
12. $17\frac{1}{10}$

Extra Practice

Computer Alternative

1. Do the multiplication program of the disk *Conquering Fractions (×, ÷)*. Press S to use the shortcuts.

Print Alternative



2. Find the product for each of the following. Use cancellation where possible. Express all final answers in simplest form.

   a. $\frac{3}{5} \times \frac{2}{3}$

   b. $\frac{3}{4} \times \frac{5}{6}$

   c. $\frac{5}{8} \times \frac{8}{25}$

   d. $\frac{5}{6} \times \frac{3}{4}$

Suggested Answers

1. Computer corrected

2. a. $\frac{2}{5}$

   b. $\frac{5}{8}$

   c. $\frac{1}{5}$

   d. $\frac{5}{8}$

e. $\frac{2}{5} \times 2\frac{1}{2}$

f. $3\frac{1}{3} \times \frac{9}{10}$

g. $1\frac{1}{3} \times 1\frac{1}{2}$

h. $1\frac{1}{3} \times 4\frac{1}{2}$

e. 1

f. 3

g. 2

h. 6

Concluding Activities

1. Find the product for each of the following. Express all final answers in simplest form.

   a. $\frac{1}{2} \times 2$

   b. $3 \times \frac{1}{3}$

   c. $\frac{8}{5} \times \frac{5}{8}$

   d. $\frac{8}{9} \times \frac{8}{9}$

   e. $1\frac{1}{5} \times \frac{5}{6}$

   f. $\frac{3}{5} \times 1\frac{2}{3}$

   g. $2\frac{2}{3} \times \frac{3}{8}$

2. What pattern do you notice from Question 1? Each pair of numbers in Question 1 are **multiplicative inverses** or **reciprocals**.

Suggested Answers

1. a. 1

   b. 1

   c. 1

   d. 1

   e. 1

   f. 1

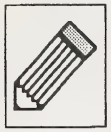
   g. 1

2. The product of multiplicative inverses is 1.

Computer Alternative

3. Do Lesson 15 of the disk *Fractions* from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA). If you need help, hold down the SHIFT key and press the ? key.

Print Alternative



4. Give the multiplicative inverse or reciprocal for each of the following numbers.

   a. $\frac{1}{7}$

   b. $\frac{3}{8}$

   c. 9

   d. $2\frac{1}{6}$

3. Computer corrected

4. a. 7

   b. $\frac{8}{3} = 2\frac{2}{3}$

   c. $\frac{1}{9}$

   d. $\frac{6}{13}$

MULTIPLYING MENTALLY

What Lies Ahead

In this section the student will review strategies used to multiply whole numbers mentally and extend these strategies to include multiplying fractions and mixed numbers mentally.

Gathering Materials

For this section the student will need these items.

Mathematics 8

Module 3

Fractions and Decimals

Solve It: Using Mental Computation for Multiplication (AIT)

(optional)

Guiding the Student

- Emphasize to the students that the goal of the section is to multiply fractions mentally.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

1. Multiply each of the following mentally using the left-right method.

   a. 123×3

   b. 512×4

   c. 934×2

2. Multiply each of the following mentally using the plus-minus method.

   a. 299×2

   b. 596×5

   c. 798×3

   d. 41×9

   e. 32×19

   f. 13×31

Suggested Answers

1. a. 369

   b. 2048

   c. 1868

2. a. 598

   b. 2980

   c. 2394

   d. 369

   e. 608

   f. 403

3. Multiply each of the following mentally.

   a. 42×15

   b. 124×25

3. a. 630

   b. 3100

Practice Activities

1. Mentally multiply each of the following using the left-right method.

   a. $3 \times 1\frac{2}{3}$

   b. $4 \times 2\frac{3}{4}$

   c. $\frac{1}{3} \times 6\frac{1}{2}$

   d. $\frac{1}{2} \times 4\frac{1}{5}$

2. Mentally multiply each of the following using the plus-minus method.

   a. $2 \times 1\frac{3}{4}$

   b. $3 \times 2\frac{4}{5}$

   c. $\frac{1}{2} \times 1\frac{7}{8}$

   d. $\frac{1}{4} \times 4\frac{4}{5}$

Suggested Answers

1. a. 5

   b. 11

   c. $2\frac{1}{6}$

   d. $2\frac{1}{10}$

2. a. $3\frac{1}{2}$

   b. $8\frac{2}{5}$

   c. $\frac{15}{16}$

   d. $1\frac{1}{5}$

3. Mentally multiply each of the following using any method.

   a. $\frac{1}{2} \times 2\frac{4}{5}$

   b. $1\frac{1}{2} \times 4\frac{2}{3}$

   c. $1\frac{2}{3} \times \frac{3}{4}$

3. a. $1\frac{2}{5}$

   b. 7

   c. $1\frac{1}{4}$

DIVIDING

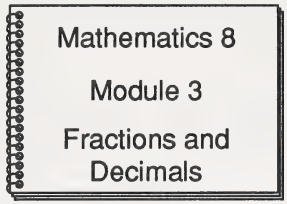
What Lies Ahead

In this section the student will learn these skills.

- estimating quotients
- dividing whole numbers, fractions, and mixed numbers using one paper and pencil method

Gathering Materials

For this section the student will need these items.



(optional)

- *Computer Drill and Instruction: Mathematics, Level D* (SRA)
- *Conquering Fractions* (MECC)

Guiding the Student

- Emphasize to the students that the goal of this section is dividing fractions.
- Help the students decide what to do in this section.
- You may wish to use segments of the video *MATH MOVES: Multiplying and Dividing Fractions* (ACCESS).
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

1. Find the quotient for each of the following. Express all final answers in simplest form.

   a. $8 \div 10$

   b. $8 \div 9$

   c. $8 \div 8$

   d. $8 \div 4$

   e. $8 \div 2$

   f. $8 \div 1$

Suggested Answers

1. a. $\frac{4}{5}$

   b. $\frac{8}{9}$

   c. 1

   d. 2

   e. 4

   f. 8

2. Use the results from Question 1 to make the following generalizations.

   a. If a number is divided by a number greater than itself, will the quotient be greater than 1, equal to 1, or less than 1?

   b. If a number is divided by itself, will the quotient be greater than 1, equal to 1, or less than 1.

   c. If a number is divided by a number less than itself, will the quotient be greater than 1, equal to 1, or less than 1?

   d. If a number is divided by 1, what will the quotient be?

3. Will the quotient of $8 \div \frac{1}{2}$ be greater than 8 or less than 8?

2. a. The quotient will be less than 1.

   b. The quotient will be equal to 1.

   c. The quotient will be greater than 1.

   d. The quotient will be equal to the number.

3. The quotient will be greater than 8.

Practice Activities

1. Complete each of the following.

   a. eight-fifths ÷ 2

   b. six-tenths ÷ 3

   c. twelve-hundredths ÷ 4

   d. ten-fifteenths ÷ 5

2. Complete each of the following.

   a. eight-ninths ÷ two-ninths

   b. six-eighths ÷ three-eighths

   c. twelve-tenths ÷ four-tenths

   d. fifty-fourths ÷ five-fourths

   e. six-sevenths ÷ four-sevenths

   f. three-tenths ÷ seven-tenths

Suggested Answers

1. a. $\frac{4}{5}$

   b. $\frac{1}{5}$

   c. $\frac{3}{100}$

   d. $\frac{2}{15}$

2. a. 4

   b. 2

   c. 3

   d. 10

   e. $1\frac{1}{2}$

   f. $\frac{3}{7}$

3. Find the quotient for each of the following. Express all final answers in simplest form.

a. $\frac{4}{5} \div 2$

b. $\frac{6}{7} \div 3$

c. $\frac{8}{9} \div 4$

d. $\frac{8}{9} \div \frac{2}{9}$

e. $\frac{6}{7} \div \frac{2}{7}$

f. $\frac{14}{10} \div \frac{7}{10}$

g. $\frac{3}{5} \div \frac{4}{5}$

h. $\frac{5}{9} \div \frac{2}{9}$

i. $\frac{3}{7} \div \frac{6}{7}$

3. a. $\frac{2}{5}$

b. $\frac{2}{7}$

c. $\frac{2}{9}$

d. 4

e. 3

f. 2

g. $\frac{3}{4}$

h. $2\frac{1}{2}$

i. $\frac{1}{2}$

4. Provide values for each of the following. Then find and simplify the final answer.

a. $\frac{3}{4} \div \frac{3}{8} = \frac{\square}{8} \div \frac{3}{8}$

b. $\frac{3}{4} \div \frac{1}{3} = \frac{\square}{12} \div \frac{\square}{12}$

c. $3 \div \frac{3}{7} = \frac{\square}{7} \div \frac{3}{7}$

d. $\frac{5}{6} \div \frac{2}{9} = \frac{\square}{18} \div \frac{\square}{18}$

e. $\frac{2}{3} \div \frac{5}{9} = \frac{\square}{9} \div \frac{5}{9}$

4. a. $\frac{3}{4} \div \frac{3}{8} = \frac{\boxed{6}}{8} \div \frac{3}{8}$

$= 2$

b. $\frac{3}{4} \div \frac{1}{3} = \frac{\boxed{9}}{12} \div \frac{\boxed{4}}{12}$

$= \frac{9}{4}$ or $2\frac{1}{4}$

c. $3 \div \frac{3}{7} = \frac{\boxed{21}}{7} \div \frac{3}{7}$

$= 7$

d. $\frac{5}{6} \div \frac{2}{9} = \frac{\boxed{15}}{18} \div \frac{\boxed{4}}{18}$

$= \frac{15}{4}$ or $3\frac{3}{4}$

e. $\frac{2}{3} \div \frac{5}{9} = \frac{\boxed{6}}{9} \div \frac{5}{9}$

$= \frac{6}{5}$ or $1\frac{1}{5}$

5. Find the quotient for each of the following. Simplify all final answers.

   a. $\frac{1}{2} \div \frac{1}{4}$

   b. $2 \div \frac{2}{5}$

   c. $\frac{2}{3} \div \frac{1}{6}$

   d. $2\frac{1}{2} \div \frac{5}{8}$

6. Joseph can swim once across the river in $\frac{1}{6}$ h. How many times can he cross the river in $\frac{3}{4}$ h?

5. a. 2

   b. 5

   c. 4

   d. 4

6. Joseph can swim across the river $4\frac{1}{2}$ times in $\frac{3}{4}$ h.

Extra Practice

1. Complete each of the following.

   a. 5 sevenths ÷ 5

   b. 4 ninths ÷ 2

   c. 6 tenths ÷ 3

   d. 20 fifths ÷ 4

2. Complete each of the following.

   a. 6 sixths ÷ 2 sixths

   b. 6 ninths ÷ 3 ninths

   c. 10 twelfths ÷ 2 twelfths

   d. 8 halves ÷ 4 halves

   e. 7 eighths ÷ 5 eighths

   f. 3 fifths ÷ 4 fifths

3. Find the quotient for each of the following. Simplify all final answers.

   a. $\frac{4}{7} \div 2$

   b. $\frac{6}{11} \div 3$

Suggested Answers

1. a. $\frac{1}{7}$

   b. $\frac{2}{9}$

   c. $\frac{2}{10}$

   d. 1

2. a. 3

   b. 2

   c. 5

   d. 2

   e. $\frac{7}{5} = 1\frac{2}{5}$

   f. $\frac{3}{4}$

3. a. $\frac{2}{7}$

   b. $\frac{2}{11}$

c. $\frac{10}{13} \div 5$

d. $\frac{6}{6} \div \frac{2}{6}$

e. $\frac{6}{9} \div \frac{3}{9}$

f. $\frac{8}{7} \div \frac{4}{7}$

g. $\frac{5}{3} \div \frac{2}{3}$

h. $\frac{4}{5} \div \frac{3}{5}$

i. $\frac{2}{7} \div \frac{5}{7}$

4. Find the quotient for each of the following. Simplify all final answers.

a. $\frac{4}{8} \div \frac{1}{2}$

b. $4 \div \frac{3}{5}$

c. $3\frac{1}{2} \div \frac{3}{4}$

d. $\frac{1}{10} \div \frac{2}{5}$

e. $1\frac{1}{4} \div \frac{2}{3}$

c. $\frac{2}{13}$

d. 3

e. 2

f. 2

g. $\frac{5}{2} = 2\frac{1}{2}$

h. $\frac{4}{3} = 1\frac{1}{3}$

i. $\frac{2}{5}$

4. a. 1

b. $\frac{20}{3} = 6\frac{2}{3}$

c. $\frac{14}{3} = 4\frac{2}{3}$

d. $\frac{1}{4}$

e. $\frac{15}{8} = 1\frac{7}{8}$

5. Thurman wants to serve eight bags of chips at his party. If each of the bowls holds $\frac{2}{5}$ of a bag, how many bowls does he need to serve all the chips?

5. Thurman needs 20 bowls to serve all the chips.

Concluding Activities

1. Find the quotient for each of the following using the fraction form and the decimal number form. Compare the answers. If a difference occurs, tell which method is more accurate.

   a. $\frac{1}{2} \div \frac{3}{4}$

   b. $\frac{3}{10} \div \frac{2}{5}$

   c. $\frac{7}{9} \div \frac{2}{3}$

   d. $\frac{3}{7} \div \frac{4}{7}$

   e. $\frac{9}{20} \div \frac{7}{10}$

Suggested Answers

1. a. $\frac{1}{2} \div \frac{3}{4} = \frac{2}{3}$ $0.5 \div 0.75 \doteq 0.7$

   The fraction method is more accurate.

   b. $\frac{3}{10} \div \frac{2}{5} = \frac{3}{4}$ $0.3 \div 0.4 = 0.75$

   Both methods are accurate.

   c. $\frac{7}{9} \div \frac{2}{3} = 1\frac{1}{6}$ $0.8 \div 0.7 \doteq 1.1$

   $\frac{7}{9} \doteq 0.8$
   $\frac{2}{3} \doteq 0.7$

   The fraction method is more accurate.

   d. $\frac{3}{7} \div \frac{4}{7} = \frac{3}{4}$ $0.4 \div 0.6 \doteq 0.7$

   $\frac{3}{7} \doteq 0.4$
   $\frac{4}{7} \doteq 0.6$

   Both methods are accurate.

   e. $\frac{9}{20} \div \frac{7}{10} = \frac{9}{14}$ $0.45 \div 0.7 \doteq 0.6$

   The fraction method is more accurate.

2. Evaluate each of the following by using a calculator which has a $\boxed{a\frac{b}{c}}$ key.

a. $\frac{3}{4} \div \frac{3}{8}$

b. $\frac{5}{12} \div \frac{1}{3}$

c. $2\frac{3}{4} \div \frac{9}{16}$

d. $1\frac{1}{5} \div 1\frac{1}{2}$

2. a. 2

b. $1\frac{1}{4}$

c. $4\frac{8}{9}$

d. $\frac{4}{5}$

ANOTHER WAY TO DIVIDE

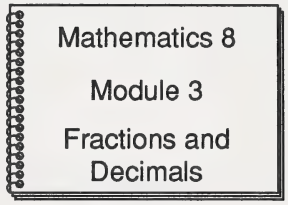
What Lies Ahead

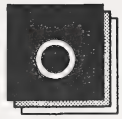
In this section the student will learn these skills.

- changing division questions to multiplication questions
- dividing fractions and mixed numbers using a calculator

Gathering Materials

For this section the student will need these items.





(optional)

- *Computer Drill and Instruction: Mathematics, Level D* (SRA)
- *Conquering Fractions* (MECC)

Guiding the Student

- Emphasize to the students that the goal of this section is to learn another way to divide fractions.
- Help the students decide what to do in this section.
- Help the students check the answers to the activities in this section and correct any errors.

Practice Activites

1. Complete each of the following by providing the missing values. Find the quotient and express it in simplest form.

   a. $\frac{1}{2} \div \frac{2}{3} = \frac{1}{2} \times \frac{\square}{\square}$

   b. $\frac{3}{4} \div \frac{5}{7} = \frac{3}{4} \times \frac{\square}{\square}$

   c. $\frac{7}{5} \div 3 = \frac{7}{5} \times \frac{\square}{\square}$

   d. $4 \div 1\frac{2}{3} = 4 \div \frac{5}{3}$

   $= 4 \times \frac{\square}{\square}$

Suggested Answers

1. a. $\frac{1}{2} \div \frac{2}{3} = \frac{1}{2} \times \frac{\boxed{3}}{\boxed{2}}$

   $= \frac{3}{4}$

   b. $\frac{3}{4} \div \frac{5}{7} = \frac{3}{4} \times \frac{\boxed{7}}{\boxed{5}}$

   $= \frac{21}{20}$ or $1\frac{1}{20}$

   c. $\frac{7}{5} \div 3 = \frac{7}{5} \times \frac{\boxed{1}}{\boxed{3}}$

   $= \frac{7}{15}$

   d. $4 \div 1\frac{2}{3} = 4 \div \frac{5}{3}$

   $= 4 \times \frac{\boxed{3}}{\boxed{5}}$

   $= \frac{12}{5}$ or $2\frac{2}{5}$

2. Change each of the following division problems to a multiplication problem and calculate each answer. Express all final answers in simplest form.

   a. $\frac{5}{8} \div \frac{3}{4}$

   b. $\frac{3}{5} \div \frac{9}{10}$

   c. $\frac{1}{2} \div 2$

   d. $\frac{3}{7} \div 4\frac{1}{5}$

   e. $3\frac{3}{4} \div 1\frac{1}{2}$

3. Bob takes $\frac{1}{10}$ h to complete one lap of a jogging track. How many laps can he complete in $\frac{3}{4}$ h?

2. a. $\frac{5}{6}$

   b. $\frac{2}{3}$

   c. $\frac{1}{4}$

   d. $\frac{5}{49}$

   e. $2\frac{1}{5}$

3. In $\frac{3}{4}$ h Bob can complete $7\frac{1}{2}$ laps.

Extra Practice

Do Question 1 or 2. Then do Questions 3 and 4.

Computer Alternative

1. a. Do Lessons 16, 17, 18, and 19 of the disk *Fractions* from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA). If you need help, remember to hold down SHIFT key and press the [?] key.

   b. Do the division program on the *Conquering Fractions* disk from the MECC series. Press [S] to use the short cuts. Press [V] to view any of the problems in picture form.

Suggested Answers

1. a. Computer corrected

   b. Computer corrected

Print Alternative

2. Find the quotients for each of the following. Express all final answers in simplest form.

   a. $\frac{3}{4} \div \frac{3}{8}$

   b. $\frac{3}{5} \div 3$

   c. $8 \div \frac{4}{9}$

   d. $1\frac{3}{8} \div 2\frac{3}{4}$

   e. $3\frac{3}{4} \div 4\frac{1}{2}$

3. Yolande has $1\frac{1}{2}$ h to do six essay questions. About how long should she spend on each question?

4. Althea works in an automobile factory. It takes her $\frac{3}{4}$ h to assemble the seats for a car. How many seats can she assemble in a $1\frac{1}{2}$ h shift?

2. a. 2

   b. $\frac{1}{5}$

   c. 18

   d. $\frac{1}{2}$

   e. $\frac{5}{6}$

3. Yolande should spend $\frac{1}{4}$ h on each question.

4. Althea can assemble 2 seats in $1\frac{1}{2}$ h.

Concluding Activities

Write each of these complex fractions as a division problem. Next, do the division and express the quotient in simplest form.

1. $\dfrac{\frac{2}{7}}{\frac{2}{9}}$

2. $\dfrac{\frac{1}{3}}{\frac{3}{4}}$

3. $\dfrac{2\frac{1}{2}}{3\frac{1}{4}}$

4. $\dfrac{7}{3\frac{1}{2}}$

Suggested Answers

1. $1\frac{2}{7}$

2. $\frac{4}{9}$

3. $1\frac{3}{13}$

4. 2

DIVIDING MENTALLY

What Lies Ahead

In this section the student will review strategies for dividing whole numbers mentally and extend these strategies to include the division of fractions and the division of mixed numbers.

Gathering Materials

For this section the student will need these items.

Mathematics 8

Module 3

Fractions and Decimals

Guiding the Student

- Emphasize to the students the goal of this section is to divide fractions mentally.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

1. Compute each of the following mentally. Use the left-right method.
   a. 963 ÷ 3
   b. 425 ÷ 5
   c. 372 ÷ 6

2. Compute each of the following mentally. Use the plus-minus method.
   a. 396 ÷ 4
   b. 496 ÷ 4
   c. 1008 ÷ 9

3. Compute each of the following mentally. Use the doubling-tripling-quadrupling method.
   a. 600 ÷ 25
   b. 325 ÷ 5
   c. 630 ÷ 15

Suggested Answers

1. a. 321
   b. 85
   c. 62

2. a. 9
   b. 124
   c. 112

3. a. 24
   b. 65
   c. 42

Practice Activities

1. Mentally divide each of the following. Use common denominators.

   a. $\frac{15}{16} \div \frac{3}{8}$

   b. $\frac{5}{12} \div \frac{5}{6}$

   c. $8 \div \frac{1}{3}$

2. Mentally divide each of the following. Use reciprocals.

   a. $11 \div 1\frac{3}{8}$

   b. $\frac{3}{7} \div \frac{1}{2}$

   c. $\frac{2}{3} \div 4$

3. Divide each of the following mentally. Use the right-left method.

   a. $6\frac{4}{7} \div 2$

   b. $9\frac{6}{11} \div 3$

   c. $1\frac{1}{2} \div \frac{1}{4}$

Suggested Answers

1. a. $2\frac{1}{2}$

   b. $\frac{1}{2}$

   c. 24

2. a. 8

   b. $\frac{6}{7}$

   c. $\frac{1}{6}$

3. a. $3\frac{2}{7}$

   b. $3\frac{2}{11}$

   c. 6

4. Mentally divide each of the following. Use the plus-minus method.

   a. $2\frac{2}{3} \div \frac{1}{3}$

   b. $7\frac{1}{4} \div 4$

   c. $1\frac{2}{7} \div 2$

5. Mentally divide each of the following. Use the doubling-tripling-quadrupling method.

   a. $3\frac{3}{8} \div 1\frac{1}{2}$

   b. $3\frac{3}{4} \div \frac{3}{4}$

   c. $4\frac{4}{5} \div 1\frac{1}{3}$

4. a. 8

   b. $1\frac{13}{16}$

   c. $\frac{9}{14}$

5. a. $2\frac{1}{4}$

   b. 5

   c. $3\frac{3}{5}$

Concluding Activities

1. The quotient of two numbers is less than 1. Find the quotient if the numbers are $\frac{1}{2}$ and $\frac{2}{5}$.

2. The quotient of two numbers is greater than 1. Find the quotient if the numbers are $\frac{2}{5}$ and $\frac{3}{5}$.

3. The quotient of a larger number and a smaller number is $\frac{1}{2}$. What is the smaller number if the larger number is $\frac{3}{4}$?

Suggested Answers

1. $\frac{2}{5} \div \frac{1}{2} = \boxed{\frac{4}{5}}$ The quotient is $\frac{4}{5}$.

2. $\frac{3}{5} \div \frac{2}{5} = \boxed{1\frac{1}{2}}$ The quotient is $1\frac{1}{2}$.

3. $\boxed{\frac{2}{3}} \div \frac{3}{4} = \frac{1}{2}$ The smaller number is $\frac{2}{3}$.

PERFORMING A SERIES OF SUMS

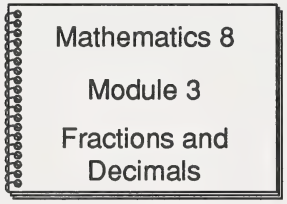
What Lies Ahead

In this section the student will learn these skills.

- estimating the sum of a series of addends
- using shortcuts to find the exact sum

Gathering Materials

For this section the student will need these items.



Guiding the Student

- Emphasize to the students the goal of this section is to add more than two fractions.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

Estimate each of these sums. Round each addend to the nearest $\frac{1}{2}$ before adding.

1. $5\frac{1}{8} + 6\frac{3}{4} + 7\frac{1}{2}$

2. $1\frac{7}{8} + 2\frac{1}{9} + 3\frac{3}{5}$

3. $\frac{1}{2} + \frac{7}{8} + \frac{3}{7} + \frac{1}{6}$

4. $\frac{3}{4} + \frac{1}{5} + \frac{2}{3} + \frac{4}{9}$

Suggested Answers

1. $5\frac{1}{8} + 6\frac{3}{4} + 7\frac{1}{2}$
$\doteq 5 + 7 + 7\frac{1}{2}$
$\doteq 19\frac{1}{2}$

2. $1\frac{7}{8} + 2\frac{1}{9} + 3\frac{3}{5}$
$\doteq 2 + 2 + 3\frac{1}{2}$
$\doteq 7\frac{1}{2}$

3. $\frac{1}{2} + \frac{7}{8} + \frac{3}{7} + \frac{1}{6}$
$\doteq \frac{1}{2} + 1 + \frac{1}{2} + 0$
$\doteq 2$

4. $\frac{3}{4} + \frac{1}{5} + \frac{2}{3} + \frac{4}{9}$
$\doteq 1 + 0 + \frac{1}{2} + \frac{1}{2}$
$\doteq 2$

Practice Activities

For each of the following sums

- estimate the answer by rounding each addend to the nearest $\frac{1}{2}$.
- find the exact answer by using the easiest method.
- look for shortcuts and express each final answer in simplest form.

1. $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{1}{3} + \frac{1}{4}$
2. $\frac{3}{4} + \frac{1}{3} + \frac{2}{5} + \frac{3}{5} + \frac{2}{3}$
3. $\frac{2}{5} + \frac{1}{5} + \frac{3}{10} + \frac{1}{2} + \frac{1}{3}$
4. $1\frac{1}{3} + 2\frac{1}{2} + 4\frac{1}{3} + 1\frac{1}{2}$
5. $6\frac{2}{3} + 4\frac{1}{2} + 7\frac{2}{3} + 1\frac{1}{2}$
6. $7\frac{1}{3} + 2\frac{1}{2} + 3\frac{2}{3} + 1\frac{3}{4} + 2\frac{2}{3}$

Suggested Answers

The estimates will vary. Exact answers are given.

1. $2\frac{1}{2}$
2. $2\frac{3}{4}$
3. $1\frac{11}{15}$
4. $9\frac{2}{3}$
5. $20\frac{1}{3}$
6. $17\frac{11}{12}$

Concluding Activities

The magic sum for this partial magic square is $2\frac{1}{10}$.

Find the missing values which will make the square a complete magic square.

$\frac{3}{4}$	$\frac{1}{2}$		$\frac{3}{20}$
		$\frac{2}{5}$	$\frac{17}{20}$
	$\frac{13}{20}$		
$\frac{9}{10}$	$\frac{7}{20}$	$\frac{11}{20}$	

Suggested Answers

$\frac{3}{4}$	$\frac{1}{2}$	$\frac{7}{10}$	$\frac{3}{20}$
$\frac{1}{4}$	$\frac{3}{5}$	$\frac{2}{5}$	$\frac{17}{20}$
$\frac{1}{5}$	$\frac{13}{20}$	$\frac{9}{20}$	$\frac{4}{5}$
$\frac{9}{10}$	$\frac{7}{20}$	$\frac{11}{20}$	$\frac{3}{10}$

PERFORMING A SERIES OF PRODUCTS

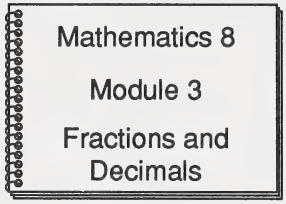
What Lies Ahead

In this section the student will learn these skills.

- estimating the product of a series of factors
- using the shortcuts to find the exact product

Gathering Materials

For this section the student will need these items.



Guiding the Student

- Emphasize to the students that the goal of this section is to multiply more than two fractions.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

Estimate a product for each of the following.

1. $3\frac{3}{5} \times 5\frac{1}{4} \times 2\frac{1}{2}$
2. $5\frac{1}{7} \times 3\frac{2}{3} \times 4\frac{1}{4}$
3. $3\frac{5}{8} \times 7\frac{1}{6} \times 2\frac{4}{5}$
4. $\frac{1}{8} \times 2\frac{1}{2} \times 3\frac{3}{4}$
5. $\frac{1}{3} \times \frac{1}{2} \times 1\frac{1}{2}$
6. $\frac{1}{4} \times 4\frac{1}{5} \times 1\frac{1}{4}$
7. $\frac{1}{3} \times \frac{1}{8} \times \frac{1}{10}$
8. $\frac{7}{8} \times \frac{4}{5} \times \frac{3}{4}$
9. $\frac{1}{2} \times \frac{3}{7} \times \frac{5}{8}$

Suggested Answers

Estimates will vary. Here are some possible estimates.

1. $3\frac{3}{5} \times 5\frac{1}{4} \times 2\frac{1}{2}$
   $\doteq 4 \times 5 \times 2\frac{1}{2}$
   $\doteq 50$

2. $5\frac{1}{7} \times 3\frac{2}{3} \times 4\frac{1}{4}$
   $\doteq 5 \times 4 \times 4$
   $\doteq 80$

3. $3\frac{5}{8} \times 7\frac{1}{6} \times 2\frac{4}{5}$
   $\doteq 3\frac{1}{2} \times 7 \times 3$
   $\doteq 73\frac{1}{2}$

4. $\frac{1}{8} \times 2\frac{1}{2} \times 3\frac{3}{4}$
   $\doteq 0 \times 2\frac{1}{2} \times 4$
   $\doteq 0$

5. $\frac{1}{3} \times \frac{1}{2} \times 1\frac{1}{2}$
   $\doteq \frac{1}{2} \times \frac{1}{2} \times 1\frac{1}{2}$
   $\doteq \frac{3}{8}$

6. $\frac{1}{4} \times 4\frac{1}{5} \times 1\frac{1}{4}$
   $\doteq 0 \times 4 \times 1$
   $\doteq 0$

7. $\frac{1}{3} \times \frac{1}{8} \times \frac{1}{10}$
   $\doteq \frac{1}{2} \times 0 \times 0$
   $\doteq 0$

8. $\frac{7}{8} \times \frac{4}{5} \times \frac{3}{4}$
   $\doteq 1 \times 1 \times 1$
   $\doteq 1$

9. $\frac{1}{2} \times \frac{3}{7} \times \frac{5}{8}$
   $\doteq \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$
   $\doteq \frac{1}{8}$

Practice Activities

For each of the following

- estimate a product
- calculate the exact product
- use shortcuts or cancelling where possible

1. $1\frac{1}{2} \times \frac{2}{5} \times \frac{2}{3}$
2. $2\frac{2}{3} \times \frac{1}{2} \times 1\frac{1}{2}$
3. $1\frac{3}{5} \times \frac{2}{7} \times 1\frac{2}{3}$
4. $\frac{3}{4} \times 2 \times 1\frac{1}{3}$
5. $1\frac{2}{7} \times 4\frac{1}{4} \times 3\frac{1}{2}$

Suggested Answers

Estimates will vary. Exact answers are given.

1. $\frac{2}{5}$
2. 2
3. $\frac{16}{21}$
4. 2
5. $19\frac{1}{8}$

Concluding Activities

1. Find the product for each of the following. Use cancelling as much as possible.

   a. $\frac{1}{2} \times \frac{2}{3}$

   b. $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4}$

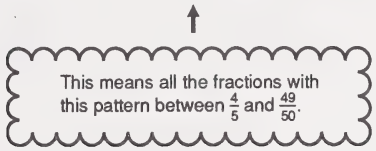
   c. $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5}$

2. What pattern do you notice in Question 1?

3. Use the pattern you discovered to find each of the following products.

   a. $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7}$

   b. $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \ldots \times \frac{49}{50}$



Suggested Answers

1. a. $\frac{1}{3}$

   b. $\frac{1}{4}$

   c. $\frac{1}{5}$

2. The answer consists of the numerator of the first fraction in the series and the denominator of the last fraction in the series.

3. a. $\frac{1}{7}$

   b. $\frac{1}{50}$

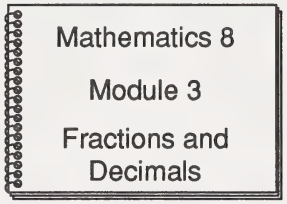
ORDER OF OPERATIONS

What Lies Ahead

In this section the student will review the rules for the order of operations with whole numbers and extend these rules to include fractions and mixed numbers.

Gathering Materials

For this section the student will need these items.



Guiding the Student

- Emphasize to the students that the goal of this section is to use the rules for the order of operations.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

Simplify each of the following using the rules for the order of operations.

1. $(5 + 3) \times 8$
2. $(60 - 20) \div 4$
3. $2 \times 8 \div 4 + 20$
4. $3^2 \times 3 + 3$
5. $(14 - 10) + 4^2 \div 8$
6. $\dfrac{2^3 + 5 + 3}{9 \times 2 - 8 - 2}$
7. $2 + 12 \div 2 - 3 \times 2$

Suggested Answers

1. 120
2. 10
3. 6
4. 30
5. 6
6. $1\frac{1}{3}$
7. 2

Practice Exercises

1. Simplify each of the following using the rules for the order of operations.

   a. $\frac{1}{4} \times \frac{2}{3} + \frac{9}{10}$

   b. $\frac{2}{5} \div \frac{4}{5} + \frac{1}{3} - \frac{1}{6}$

   c. $\left(\frac{1}{2} + \frac{3}{4}\right) \times \frac{2}{5} \div \frac{3}{8}$

   d. $\frac{3}{4} + \frac{1}{3} \times \left(\frac{2}{3} \div \frac{4}{9}\right)$

   e. $\frac{7}{10} \div \frac{4}{5} + \frac{17}{20} - \left(\frac{7}{8} + \frac{3}{4}\right)$

Suggested Answers

1. a. $1\frac{1}{15}$

   b. $\frac{2}{3}$

   c. $1\frac{1}{3}$

   d. $1\frac{1}{7}$

   e. $\frac{1}{10}$

2. Simplify each of the following using the order of operation rules.

a. $2\frac{1}{2} \div \left(1\frac{3}{4} + \frac{1}{2} \div \frac{1}{3}\right) - \frac{3}{7}$

b. $1\frac{4}{5} \div \left(3\frac{1}{2} + 1\frac{1}{4}\right) - \frac{7}{19}$

c. $1\frac{1}{2} \div 1\frac{1}{3} - 1\frac{1}{3} \div 1\frac{1}{2}$

d. $3\frac{3}{5} \div 2\frac{1}{5} \div \left(5\frac{9}{11} - 4\frac{2}{11}\right)$

e. $\left(1\frac{1}{2} + 2\frac{3}{4}\right) \times \left(2\frac{1}{2} \times \frac{3}{10} \div \frac{1}{4} + \frac{1}{2}\right) + 2\frac{3}{5} + 3\frac{3}{20}$

2. a. $\frac{31}{91}$

b. $\frac{1}{95}$

c. $\frac{17}{72}$

d. 1

e. $20\frac{5}{8}$

Extra Practice

1. In each of the following, circle the operation to be done first. Do not calculate the answers.

   a. $\frac{1}{2} \times \frac{2}{3} - \frac{4}{5}$

   b. $\left(\frac{3}{4} + \frac{7}{8}\right) - \frac{4}{9}$

   c. $\frac{3}{2} + \frac{1}{4} - \frac{5}{8} \div \frac{1}{10}$

2. In each of the following, number the operations in the order in which they must be done. Do not calculate the answers. Part a. has been done as an example.

   a. $\frac{1}{4} \times \frac{8}{10} - \left(\frac{2}{3} + \frac{3}{5}\right)$

   b. $\frac{1}{6} + \frac{3}{4} \div \frac{1}{2}$

   c. $\frac{4}{3} \times \left(\frac{2}{9} \div \frac{11}{10}\right) - 3\frac{1}{4}$

   d. $\frac{5}{8} \div \frac{3}{2} - \frac{4}{5} + \frac{1}{2} \times \frac{4}{3}$

Suggested Answers

1. a. $\boxed{\frac{1}{2} \times \frac{2}{3}} - \frac{4}{5}$

   b. $\boxed{\left(\frac{3}{4} + \frac{7}{8}\right)} - \frac{4}{9}$

   c. $\frac{3}{2} + \frac{1}{4} - \boxed{\frac{5}{8} \div \frac{1}{10}}$

2. a. $\underset{2}{\frac{1}{4}} \times \underset{3}{\frac{8}{10}} - \left(\underset{1}{\frac{2}{3}} + \frac{3}{5}\right)$

   b. $\underset{2}{\frac{1}{6}} + \underset{1}{\frac{3}{4}} \div \frac{1}{2}$

   c. $\underset{2}{\frac{4}{3}} \times \left(\underset{1}{\frac{2}{9}} \div \underset{3}{\frac{11}{10}}\right) - 3\frac{1}{4}$

   d. $\underset{1}{\frac{5}{8}} \div \underset{3}{\frac{3}{2}} - \underset{4}{\frac{4}{5}} + \underset{2}{\frac{1}{2}} \times \frac{4}{3}$

3. Is the answer for each of the following correct? Answer by writing **yes** or **no**. Where the choice is *no*, correct the answer for that question.

   a. $\frac{1}{2} \div \frac{5}{4} + \frac{2}{3} = 1\frac{1}{15}$

   b. $\frac{7}{8} + \frac{3}{4} \div \left(\frac{1}{2} \times \frac{3}{4}\right) = 4\frac{1}{3}$

   c. $\frac{3}{2} \times \frac{4}{5} - \frac{5}{6} \div \frac{5}{3} + \frac{1}{4} = \frac{9}{20}$

   d. $\left(\frac{1}{3} + \frac{1}{2}\right) \div \frac{7}{6} \times 3 = 2\frac{1}{7}$

3. a. yes

   b. no, $\frac{7}{8} + \frac{3}{4} \div \left(\frac{1}{2} \times \frac{3}{4}\right) = 2\frac{7}{8}$

   c. no, $\frac{3}{2} \times \frac{4}{5} - \frac{5}{6} \div \frac{5}{3} + \frac{1}{4} = \frac{19}{20}$

   d. yes

Concluding Activities

Solve these problems.

1. The body of a dinosaur is 32 m in length. The head of the dinosaur is $\frac{1}{8}$ as long as its body. The tail is as long as the head plus $\frac{1}{4}$ of the body. How long is the dinosaur altogether?

Suggested Answers

1. $32 + \left(\frac{1}{8} \times 32\right) + \left(\frac{1}{4} \times 32\right) + \left(\frac{1}{8} \times 32\right)$

$= 32 + 4 + 8 + 4$

$= 48$

The dinosaur is 48 m long altogether.

2. Pam had a bag of candies. She gave $\frac{1}{2}$ of the candies to her sister and ate one herself. After that she gave away $\frac{1}{2}$ of what she had left and ate one herself. Finally she gave away $\frac{1}{2}$ of what she had left to her friend and ate one herself. If she had two candies left and if all the candies were whole, how many candies did she have originally?

Work backwards.

At the end she had two candies left.

In the last step she gave away $\frac{1}{2}$ of what she had and ate one herself. How many candies did she have before this?

$$\frac{1}{2} \times \square - 1 = 2$$

$$\frac{1}{2} \times \boxed{6} - 1 = 2$$

She had 6 candies previously.

In the middle step she gave away $\frac{1}{2}$ of what she had and ate one herself. How many candies did she have before this?

$$\frac{1}{2} \times \square - 1 = 6$$

$$\frac{1}{2} \times \boxed{14} - 1 = 6$$

She had 14 candies previously.

In the first step she gave away $\frac{1}{2}$ of what she had and ate one herself. How many candies did she have before this?

$$\frac{1}{2} \times \square - 1 = 14$$

$$\frac{1}{2} \times \boxed{30} - 1 = 14$$

She had 30 candies at the beginning.

NUMBER SYSTEMS

What Lies Ahead

In this section the student will learn to interpret rational numbers.

Gathering Materials

For this section the student will need these items.

Mathematics 8

Module 3

Fractions and Decimals

Guiding the Student

- Emphasize to the students that the goal of this section is to interpret rational numbers and how the different kinds of numbers are related.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

Introductory Activities

1. Answer each of the following by writing **true** or **false**.

   a. Zero is not a rational number.

   b. All integers are rational numbers.

   c. All rational numbers are integers.

   d. All whole numbers are integers.

   e. All integers are whole numbers.

   f. All negative numbers are rational numbers.

   g. All rational numbers are negative numbers.

   h. All whole numbers are rational numbers.

   i. All rational numbers are whole numbers.

   j. All positive and negative proper fractions are rational numbers.

Suggested Answers

1. a. false

   b. true

   c. false

   d. true

   e. true

   f. true

   g. false

   h. true

   i. false

   j. true

2. Complete this chart by identifying each number as a natural number, whole number, integer, or rational number. Some of the given numbers fit into more than one category.

   a. 1

   b. $\frac{3}{5}$

   c. – 0.125

   d. – 3

   e. 0

N	W	I	Q
1	1	1	1
			$\frac{3}{5}$
			– 0.125
		– 3	– 3
	0	0	0

3. Express each of the following as a quotient of two integers.

a. 5

b. -8

c. 0.44

d. -0.06

e. $\frac{3}{5}$

f. $-\frac{2}{7}$

g. $1\frac{1}{3}$

h. $-1\frac{3}{4}$

3. a. $5 = \frac{+5}{+1}$ or $\frac{-5}{-1}$

b. $-8 = \frac{-8}{+1}$ or $\frac{+8}{-1}$

c. $0.44 = \frac{+44}{+100}$ or $\frac{-44}{-100}$

d. $-0.06 = \frac{+6}{-100}$ or $\frac{-6}{+100}$

e. $\frac{3}{5} = \frac{+3}{+5}$ or $\frac{-3}{-5}$

f. $-\frac{2}{7} = \frac{+2}{-7}$ or $\frac{-2}{+7}$

g. $1\frac{1}{3} = \frac{+4}{+3}$ or $\frac{-4}{-3}$

h. $-1\frac{3}{4} = \frac{-7}{+4}$ or $\frac{+7}{-4}$

Practice Activities

Using each pair of rational numbers, decide which of the two is larger.

1. $\frac{3}{7}$ and $\frac{6}{7}$
2. $\frac{5}{8}$ and $\frac{3}{4}$
3. $1\frac{7}{8}$ and $1\frac{9}{10}$
4. $-\frac{3}{5}$ and $-\frac{4}{5}$
5. $-2\frac{3}{10}$ and $-2\frac{1}{10}$
6. 0.75 and 0.3
7. -1.03 and -1.12
8. -2.75 and $-2\frac{3}{5}$

Suggested Answers

1. $\frac{3}{7} < \frac{6}{7}$
2. $\frac{5}{8} < \frac{3}{4}$
3. $1\frac{7}{8} < 1\frac{9}{10}$
4. $\frac{-3}{5} > \frac{-4}{5}$
5. $-2\frac{3}{10} < -2\frac{1}{10}$
6. $0.75 > 0.3$
7. $-1.03 > -1.12$
8. $-2.75 < -2\frac{3}{5}$

Concluding Activities

Is each of these decimal numbers a rational number? Explain why or why not.

1. 0.8
2. 0.924
3. $0.\dot{2}3$
4. $-0.\dot{5}$
5. – 0.75
6. 2.123 122 312 222 ...

Suggested Answers

1. Yes, all terminating decimals are rational numbers.
2. Yes, all terminating decimals are rational numbers.
3. Yes, all repeating decimals are rational numbers.
4. Yes, all repeating decimals are rational numbers.
5. Yes, all terminating decimals are rational numbers.
6. No, decimals that do not repeat or terminate are not rational numbers.

SUMMARY

What Lies Ahead

In this section the student will review the skills learned in Module 3.

Gathering Materials

For this section the student will need these items.

Mathematics 8

Module 3

Fractions and Decimals

Guiding the Student

- Emphasize to the students that the goal of this section is to review the module.
- Help the students check their answers to the pretest in Section 2 and correct any errors.

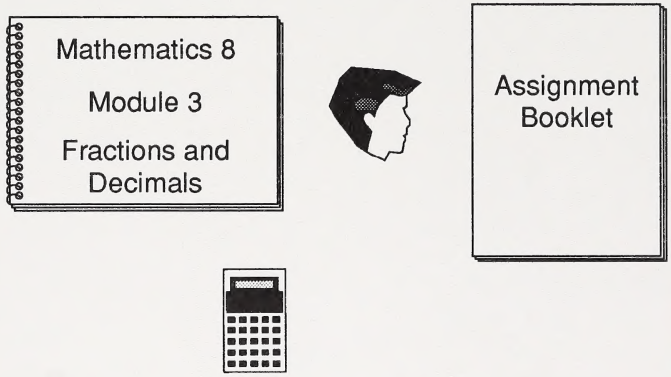
MODULE CONCLUSION

What Lies Ahead

The student is now ready to do the assignment in the Assignment Booklet. The student will be graded on the work done in this booklet.

Gathering Materials

The student will need the following items.



Guiding the Student

- Have the student complete the module assignment independently. The student may use resource material, but cannot get help. The student should attempt all parts of the assignment.
- Afterwards, you should both complete the declaration. You should submit the Assignment Booklet for a grade and feedback.

L.R.D.C.
Producer

MATH 8

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